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ABSTRACT

Papers in this volume include the following: "Constraints on Dative Acquisition by Chinese ESL Learners" (Hua Dong Fan); "The Learnability of Locality Conditions on Quantification" (Thomas Lee); "Do Learning Environments Make a Difference? A Study on the Acquisition of the English Interrogatives by Three Types of Cantonese Classroom Learners" (Gladys Tang); "The Stress Patterns of Nonsense English Words of Cantonese-speaking ESL Learners" (Cathy Wong); "Relative Complexity: Beyond Avoidance: (Virginia Yip and Stephen Matthews); and "The Interpretation of Linguistic Signs and the Role of Inference" (Cheng Yumin). (Author/JL)

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Editorial Note

CUHK Papers in Linguistics is published annually by the linguistics staff of the Department of English at the Chinese University of Hong Kong. The contributions to this volume reflect the department's research focus on first and second language acquisition. Lee's paper deals with an aspect of his studies on Chinese children's acquisition of quantification. Tang's paper is based on her doctoral thesis on the acquisition of interrogatives by Chinese learners. The papers by Hua, Wong and Yip & Matthews were presented at the Conference on Second Language Acquisition in the Chinese Context held at CUHK in July 1991.

We are pleased to include a paper by Professor Cheng Yumin who was visiting CUHK from Fudan University, Shanghai in spring 1990. Two of our former postgraduate students, Cathy Wong Sin Ping and Hua Dong Fan have also contributed papers based on their work here.

Finally, we wish to thank the Trustees of Lingnan University and the United Board of Higher Christian Education in Asia for funding this publication.

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Constraints on Dative Acquisition by Chinese ESL Learners*

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1. Introduction

In English, while most dative verbs can appear in both the prepositional ([__NP PP]) and the double-object dative ([__NP NP]) structures, some verbs (e.g. *deliver*, *construct*, *pull*, *pick*) allow only the [__NP PP] structure, as in:

(1) a. John gave a book to Mary.
b. John gave Mary a book.
c. John made a cake for Mary.
d. John made Mary a cake.

(2) a. John delivered a letter to Mary.
b. *John delivered Mary a letter.
c. John constructed a house for Mary.
d. *John constructed Mary a house.
e. John pulled a box to Mary.
f. *John pulled Mary a box.
g. John picked a dress for Mary.
h. *John picked Mary a dress.

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* This article is based on my M.Phil. dissertation *The Acquisition of the English Dative by Chinese ESL Learners* submitted to the Division of English of the Graduate School of the Chinese University of Hong Kong in May, 1991. The writing of this dissertation has benefited substantially from insightful comments by Dr. Thomas Lee, Dr. Virginia Yip, Dr. Gladys Tang, and Dr. Steve Matthews. I would also like to acknowledge the assistance provided to me in so many ways by the Division of English of the Graduate School of CUHK, and the financial support provided to me by the Lingnan Foundation, the United Board of Higher Christian Education in Asia, and the Weixin Group of Hong Kong.

The limited productivity of the double-object dative in English presents a learnability problem to the L1 learner. As Baker (1979) observes, given that negative evidence is in general not available to the learner, it would logically be impossible for the learner to restrict the double-object dative to the right set of dative verbs, once heovergeneralizes the structural alternation (generally known as the dative alternation) between pairs of sentences such as (1a-b) or (1c-d), and consequently commits errors such as (2b), (2d), (2f), or (2h).

This problem may arise in L2 acquisition of the English dative also. While L2 acquisition is different from L1 acquisition in many ways (see Bley-Vroman (1989) for a detailed discussion), White (1989) argues that L2 input may be deficient to the extent that it underdetermines the L2 grammar in precisely the same way that L1 input underdetermines the L1 grammar. In the case of dative acquisition, the L2 input, like the L1 input, is deficient because negative evidence (in the form of formal instruction or error correction) on the ungrammaticality of double-object sentences such as (2b), (2d), (2f), or (2h) is generally not available to the learner, and because negative evidence provided in reference grammar books or English textbooks is scanty.[1] As a result, the L2 learner will face the same learnability problem if he ever overgeneralizes the dative alternation. It will therefore also be interesting to know how L2 learners overcome this problem when acquiring the English dative.

Baker (ibid.) proposes that in acquiring the English dative, the learner acquires the complement frame(s) for a given dative verb only if the

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[1] Some reference grammar books (e.g. Swan 1980) and English textbooks intended for non-native speakers (e.g. Rutherford 1975) have pointed out that verbs such as *explain*, *suggest*, *describe*, *explain*, *repeat*, and *prescribe* must be used with a preposition before an indirect object. However, given the existence of many other dative verbs which appear only in the [__NP PP] structure, this limited amount of negative evidence is not sufficient. As for some textbooks used in secondary schools in Hong Kong (e.g. *Integrated English*, or *Trend*), instruction on the English dative consists of no more than a few sentences such as:

a. Give me some advice.
b. He gave Mary some books about swimming.
c. Mary lent her friend one of the books.
d. Can you lend/give me a ruler?

input data contains exemplars of the frame(s). The learner thus faces no learnability problem, as he does not overgeneralize the dative alternation in the first place. However, Mazurkewich and White (1984), Bowerman (1987), and Gropen et al. (1989) show that learners are not as conservative as Baker assumes. They at times extend the double-object dative to non-alternating dative verbs, or to novel verbs modeled only in the [__NP PP] structure. Mazurkewich (1984) shows that the same may also be true of L2 learners of English.

The question one has to answer then is how the learner overcomes the overgeneralization problem in the absence of negative evidence. Mazurkewich and White (1984), Gropen et al. (1989) both hypothesize that the learner is able to restrict the scope of the double-object dative through recourse to a semantic and a morphophonological constraint on the English double-object dative.

The semantic constraint specifies that the indirect object in the double-object structure has to be the `prospective possessor' of the entity denoted by the direct object (Green 1974, Oehrle 1976, Goldsmith 1980, Stowell 1981). This offers an explanation as to why double-object sentences like (1b) or (1d) are well-formed whereas those like (3b) or (3d) are not.

(3) a. John sent a letter to New York.
b. *John sent New York a letter.
c. John opened a window for Mary.
d. *John opened Mary a window.

The indirect object in (1b) and (1d) signifies a goal and a beneficiary respectively (both of which can be interpreted as prospective possessors of the direct object). Whereas, the NP immediately following the verb in (3b) refers to a place, and that in (3d) a deputive (a person in whose stead the person denoted by the subject undertakes an action).

The morphophonological constraint, on the other hand, relates to the native/Latinate distinction in the English vocabulary. Phonologically, most words of native origin are monosyllabic or disyllabic with stress on the first syllable. Morphologically, affixes like -ness, -hood, -ful, -er attach preferentially to native words, whereas affixes such as con-, in-, -ity, -ic attach to Latinate words. In general, only verbs of native origin permit the double-object structure (Oehrle 1976, Stowell 1981, Mazurkewich and White 1984). Since verbs such as *deliver* and *construct* are Latinate in origin, sentences such as (2a) and (2c) do not have corresponding double-object forms.

Mazurkewich and White (1984) propose that in acquiring the English dative, children first formulate a lexical rule in their lexicon relating the two

complement frames of alternating dative verbs on the basis of positive evidence. They then may extend the rule to non-alternating dative verbs. However, they will drop overgeneralization errors when they realize that the indirect object in the double- object structure has to be the prospective possessor of the direct object, and that the rule only relates lexical entries of native verbs.

Gropen et al. (1989), however, suggest that in acquiring the English dative, it is unlikely that learners should first go through a stage in which they apply the dative rule as a purely syntactic operation without imposing constraints on it. Rather, plausibly the use of the double-object dative is constrained from the start. They see the dative alternation in English as inherently an operation that changes the lexicosemantic structure of the prepositional dative X causes Y to go to Z (which is transparent from the surface syntax, given prepositional marking) to that of the double-object dative X causes Z to have Y. This operation is assumed to be easily effected, as it is motivated by the semantics of dative verbs appearing in both dative structures in the input, which signify causation of possession change, and by what Gropen et al. call `near-universal linking rules' that map thematic roles to syntactic positions. Such linking rules specify, among other things, that in the unmarked case a causee or patient argument will be linked to the syntactic object, or that the syntactic object will be linked to a causee or patient.[2] Acquisitionally, since this semantic structure could be available to children from the start through an easily-effected operation, we would expect it to pose a constraint on the use of double-object dative from a very early stage of L1 dative acquisition. It follows naturally from this structure that Z (the indirect object) should be some entity going to possess Y (the direct object), and that Z should be involved by the verb as a causee.

What if then children overgeneralize the double-object construction to dative verbs which pertain to the general event of causation of possession change, but which do not occur in that form in English? Gropen et al. observe that these lexical exceptions fall into two types. Besides Latinate verbs such as *deliver* and *construct*, there are native verbs such as *pull*, *shout*, or *pick*. Since they suggest actions which could involve goal or beneficiary indirect

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2 Such 'linking rules' are near-universal because they do not characterize all human languages. As Bowerman (1990) points out, languages characterized as syntactically ergative link the patient to the subject position and the agent to the object position.

objects as causees less naturally than canonical dative verbs such as *send* or *throw*, they therefore do not occur in the double-object form.

Gropen et al. propose that overgeneralizations involving Latinate verbs can be ruled out through recourse to the morphophonological constraint. They observe that the statistical phenomenon that parents use the native vocabulary and almost no Latinate verbs when talking to their children may lead children to assume that English has a morphophonological constraint on the double-object dative.

Gropen et al. also propose that overgeneralizations involving exceptional native verbs would be few, as children are conservative in that they will assign the [__NP NP] complement frame to dative verbs which they either have heard used in that form, or which are semantically `similar' to them. Verbs like *throw* and *kick* are considered `similar', as both of them pertain to the grammatically-relevant notion of `instantaneous causation of motion', though they differ in the specific idiosyncratic properties of manner. And having seen *throw* being used in the double-object form, children would automatically generalize it to kick. However, such generalization will not extend to verbs like *pull*, which pertain to other grammatically-relevant notions. *Pull*, for instance, signifies `continuous causation of accompanied motion in some manner'.

Randall (1987, 1990) proposes yet another mechanism for the acquisition of the English dative. She notes that verbs which do and do not occur in the double-object structure differ in their basic argument structure. The former (e.g. give, sent, bring, lend, tell, show) standardly take two mandatory objects, as shown in (4), whereas the latter (e.g. deliver, contribute, report, explain, dictate, recite) can take the direct object alone, though optionally, they can also take the indirect object as in (5).[3]

(4) a. *Pablo gave his painting.
Pablo gave his painting to Cressida.
b. *Cressida sent the book.
Cressida sent the book to Romeo.

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[3] It has been pointed out in the literature (Bowerman 1987, Hawkins 1987, Gropen et al. 1989) that Randall's observation is descriptively too strong, since many alternating dative verbs do allow a direct object NP to standardly occur alone (e.g. *sell*, *kick*, *serve*, *write*, *teach*, *buy*, *cook*).

(5) a. Romeo delivered the posies.
Romeo delivered the posies to Joan.
b. Joan explained his painting.
Joan explained his painting to Pablo.

She also notes that English poses a constraint on the order of the constituents within a maximal projection which specifies that obligatory elements be attached closer to the phrasal head than optional elements (Jackendoff 1977, Randall 1987: 9-10). Randall calls this constraint the Order Principle. So, in an English VP, the required order is obligatory-optional, and violation of such an order leads to ungrammaticality, as shown in (6).

(6) a. Pablo invited Doris to the art opening.
Pablo invited (*to the art opening) Doris.
b. Dylan spent a lot of money on drink.
Dylan spent (*on drink) a lot of money.

Randall suggests that when acquiring the English dative, the child would first overgeneralize the dative alternation because they do not realize that for some dative verbs such as *deliver*, the indirect object is optional. However, when he hears these verbs occur with the direct object alone in unmarked contexts, he marks the indirect object as optional. And since the use of an optional indirect object before an obligatory direct object in the double-object construction violates the Order Principle, the learner would stop using these verbs in that construction. Here, though the child has no access to direct negative evidence informing him that some dative verbs cannot be used in the double-object form, the input provides some indirect evidence that serves just this purpose.

The accounts outlined above present interesting perspectives on the resolution of the learnability problem. However, a number of issues have to be subjected to vigorous empirical studies before we can establish the validity of one proposal or another. First, we lack systematic information on whether L1 learners violate the semantic constraint, as previous studies are concerned mainly with whether, but not what kind of, overgeneralizations occur.[4] With

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4 White (1987) carried out an act-out and an imitation test with 20 children aged 3;8 to 5;8 on sentences involving some for-dative verbs (e.g. *draw, get, tie, drive*), in an attempt to see if overgeneralization errors that violate the semantic constraint occur. The results from the act-out task show that the

regard to L2 dative acquisition, information on this issue is also lacking, though issues like markedness, L1 influence have been explored (Mazurkewich 1984, Le Compagnon 1984, Hawkins 1987). Second, it is yet to be established empirically whether learners are sensitive to the subtle semantic distinction between canonical dative verbs and exceptional native verbs like *pull* or *shout*, which, according to Gropen et al. satisfy the semantic constraint only marginally. Moreover, it is unknown whether semantic 'similarity' would be a sufficient condition to refrain learners from ever extending the double-object dative to native verbs such as *pull* or *shout*. Third, the empirical validity of Randall's proposal is uncertain. We do not know if learners actually utilize knowledge about the argument structure of dative verbs and general principles of English phrase structure in overcoming overgeneralizations in dative acquisition. It is the main objective of the present study to provide experimental evidence for the assessment of these issues.

2. Test design and results

To elicit information for assessing the issues outlined above, four grammaticality judgment tests were administered to two groups of Chinese ESL learners, and a control group of native speakers in Hong Kong in the fall of 1990. The two L2 groups consist of 16 form 4 English-medium secondary school students and 16 4th-year English major students at the Chinese University of Hong Kong, respectively. The native English speakers were 8 exchange students from the United States and Canada. The test sentences in

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children did not consistently act out sentences containing alternating dative verbs (e.g. *draw, get*) by moving the entities denoted by the direct object and the indirect object. Neither did they act out sentences containing verbs such as tie or drive by only manipulating the entity denoted by the direct object. White interpreted those cases in which the children acted out both the direct and the indirect object of the sentences such as **open the doll the box* and **drive the teddy the car* as indications of overgeneralization violating the semantic constraint. However, since it is not always necessary to act out the benefactive or deputive roles involved in double-object sentences containing for-dative verbs, nor are they easy to act out, and since, as White herself observes, 'all the sentences make complete sense without acting out the indirect object' (p.270), act-out tests may not be appropriate for eliciting information about overgeneralization of the for- double-object datives.

each test were randomized, and the four tests were contained in one single package, one test following another. There was no time limit on the tests. However, the subjects were all able to finish the tests within 30 minutes.

2.1. Test 1

This test included the verbs given in table 1. The verbs in A and D are native verbs which may occur in the double-object form. B and E are Latinate verbs which do not occur in double-object datives. The verbs in C and F belong to subclasses of verbs which, according to Gropen et al. potentially signify causation of possession change, but which do not in fact appear in the double-object form, probably because they involve the indirect object as causee in less direct ways. The verbs in C are further divided into two groups: Ca and Cb. The former are verbs of continuous causation of accompanied motion in some manner while the latter are verbs of manner of speaking and communication of propositions and propositional attitudes (cf. Gropen et al. 1989: 244). Cell F contains only two native for-dative verbs which cannot occur in the [__NP NP] form.[5] The four verbs in Cell G normally involve the indirect object only as a deputive, and thus do not occur in the double-object form.

In the judgment test, all the verbs in Table 1 (except for those in A and G) appeared in a pair of sentences, one in the [__NP PP] form, and the other in the [__NP NP] form (see Appendix 1.2.).

The verbs in A appeared in three pairs of sentences as shown in (7). The verbs in G appeared in two pairs of sentences, as shown in (8).

(7) A. a. *send (Mary)* sentences
e.g. John sent a letter to Mary.
John sent Mary a letter.
b. *send (New York)* sentences
e.g. John sent a letter to New York.
*John sent New York a letter.

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5 There is disagreement among linguists about the grammaticality status of double-object sentences containing the verb choose (e.g. *John chose Mary a dress*). Mazurkewich and White (1984:279), Hawkins (1987:37), and Green (1974:93) consider such sentences as grammatical whereas Gropen et al. (1989:244) don't. In the present study, I follow Gropen el al.'s intuition, treating such sentences as not permissible in English.

c. *send (school)* sentences
e.g. John sent a letter to the school.
?John sent the school a letter.

(8) G. a. *open (window)* sentences
e.g. John opened a window for Mary.
*John opened Mary a window.

b. *open (whisky)* sentences
e.g. John opened a bottle of whisky for Mary.
?John opened Mary a bottle of whisky.

TABLE 1

Verbs Used in Test 1

To-dative	*For-dative*
Alternating**	Alternating
A. send	D.make
ship	find
bring	build
cable	sing
Non-alternating*	Non-alternating
B. deliver	E.construct
transport	design
display	create
report	obtain
C a.pull	F.choose
push	pick
lift	
lower	G.open
b.shout	wash
scream	weigh
say	pack

** Verbs that occur in both the [__NP PP] and [__NP NP] structures;
* Verbs that occur only in the [__NP NP] structure.

The remaining 6 types of sentences contain the verbs in B, C, D, E, and F, respectively. They all have an animate indirect object, and are named after the first verb in each verb category:

(9) B. deliver sentences
e.g. John delivered a letter to Mary.
*John delivered Mary a letter.

Ca. pull sentences
e.g. John pulled a box to Mary.
*John pulled Mary a box.

Cb. shout sentences
e.g. John shouted the news to Mary.
*John shouted Mary the news.

D. make sentences
e.g. John made a cake for Mary.
John made Mary a cake.

E. construct sentences
e.g. John constructed a house for Mary.
*John constructed Mary a house.

F. choose sentences
e.g. John chose a dress for Mary.
*John chose Mary a dress.

All the test sentences are in simple declarative form. The verbs all appeared in the simple past tense. With a few exceptions, all the sentences in the [__NP PP] form contained six words, and [__NP NP] form five words. The subjects were asked to indicate whether a given test sentence was acceptable, unacceptable, or they were uncertain about its acceptability status. Only one response was permitted per test sentence (see Appendix 1.1).

For a particular sentence type, the number of times an individual gave a particular response category (i.e. acceptable, unacceptable, uncertain) to the 4 prepositional or the 4 double-object dative sentences within that sentence type was his score for that response category. The total score of an individual across response categories for the [__NP PP] and the [__NP NP] dative forms within a sentence type should be 4 respectively. The shout sentence type consisted of three test verbs, and the choose sentence type two test verbs, for each dative structure. In order to render the mean scores for these two types of sentences comparable to those for other types of sentences, the mean scores for the shout type were multiplied by 4/3, and those for the choose type by 2.

The figures in Table 2 show the mean acceptance scores of each group for various sentence types in both the prepositional and the double-object structure.

2.1.1. Results

All the three groups of subjects showed a high degree of acceptance of the sentences in the [__NP PP] form, irrespective of whether or not the preposition used was to or for. In general, the mean acceptance score was 3.50 or more for the three groups of subjects.

The native speakers' performance tallied with linguists' analysis of the English double-object dative. The mean scores for the ungrammatical double-object sentences (indicated by asterisks in the table) were generally low, ranging from 0.33 (for the *shout* type) to 1.75 (for the *choose* type). On the other hand, the grammatical double-object sentences received high acceptance scores (3.50 for the *send (Mary)* type, and 3.38 for the *make* type).

In contrast, the secondary subjects showed a generally low acceptance of all the 11 types of sentences in the double-object form, regardless of whether the sentences are grammatical or not in English. The mean acceptance scores for the ungrammatical sentences ranged between 0.75 (for the *open (window)* type) and 2.31 (for the *deliver* type). The difference between the acceptance score for the *send (Mary)* type and that for the *make* type is statistically significant (2.25 vs 1.38; $t=2.33$, $p=0.034$). This confirms the finding in previous studies (Mazurkewich 1984, Hawkins 1987) that L2 learners acquire the to-double-object dative before the for- double-object dative.

Although secondary subjects gave generally low scores of acceptance for double-object datives, they treated the *send (Mary)* and *send (New York)* types differently. The subjects accepted the latter significantly less (2.25 vs 1.13; $t=2.91$, $p=0.011$), reflecting an effect of the semantic constraint.

The learners' sensitivity to the semantic constraint on the double-object dative can also be seen from the results on the *make* and *open (window)* sentences. The mean acceptance score for the former type (1.38) exceeds that for the latter (0.75). The difference approaches significance ($t=1.99$, $p=0.066$).

The secondary subjects also distinguished the canonical *send (Mary)* type from the *pull* type. The difference between the subjects' performance for the two types is significant (2.25 vs 1.38; $t=2.21$, $p=0.04$). As previously noted, verbs like *pull* are not able to occur in the double-object form, probably because their meaning structure involves the indirect object as causee less directly than verbs such as *send*.

TABLE 2

Judgment of Prepositional and Double-Object Datives

Mean Acceptance Score (Maximum=4)

Test Sentence Types						
To-dative	[__NP PP]			[__NP NP]		
	SS	US	NS****	SS	US	NS
A. send (Mary)	3.87	3.75	3.75	2.25	3.19	3.50
send (New York)*	3.81	3.62	4.00	1.13	1.06	1.13
send (school)	3.50	3.63	4.00	1.94	2.31	2.75
B.deliver**	3.75	3.56	3.50	2.31	1.38	0.63
C a.pull***	3.44	2.94	3.38	1.38	1.00	0.63
b.shout***	3.67	3.67	3.67	1.58	0.58	0.33
For-dative						
D.make	3.44	3.87	4.00	1.38	2.81	3.38
E.construct**	3.56	3.75	4.00	1.69	0.88	1.00
F.choose***	3.87	3.75	3.75	1.00	1.13	1.75
G.open (window)*	3.50	3.81	3.88	0.75	0.31	0.50
open (whisky)	3.81	3.75	4.00	1.44	1.38	1.87

**** SS=Secondary subjects, US=University subjects, NS=Native speakers;
*** Sentences containing exceptional native verbs;
** Sentences containing Latinate verbs;
* Sentences containing a `locative' or a `deputive' indirect object.

The effect of the semantic constraint on the subjects' response can be seen more clearly if we compare the results on the *deliver, pull,* and *shout* types of sentences, and the results on the *construct* and *choose* types. The mean acceptance score for the *deliver* type was significantly higher than that for the *pull* sentences (2.31 vs 1.38; t=4.39, p=0.001). The score for the *construct* type was also significantly higher than that for the *choose* type (1.69 vs 1.00; t=2.30, p=0.04). This distinction cannot be attributed to characteristics of the

input, since presumably the subjects could not have heard any of these test sentences before.

The secondary subjects, however, did not differentiate between the *send (Mary)* and *deliver* types, nor the *make* and *construct* types. Interestingly, the subjects accepted the *deliver* sentences slightly more than the *send (Mary)* sentences (2.31 vs 2.25), and the *construct* sentences more than the *make* sentences (1.69 vs 1.38). This indicates that the native/Latinate morphophonological distinction was irrelevant to the secondary subjects' acceptability judgment of double-object sentences.

Compared with the secondary subjects, the performance of the university students showed the following differences. First, as Table 2 indicates, the university subjects showed a much greater acceptance of grammatical double-object dative sentences, i.e. the *send (Mary)* and *make* types than the secondary subjects. The mean acceptance scores for these two types were significantly higher than the corresponding scores given by the secondary subjects (3.19 vs 2.25, $t=2.37$, $p=0.028$ for the *send (Mary)* type; 2.81 vs 1.38, $t=3.43$, $p=0.002$ for the *make* type). On the other hand, the university subjects showed a lower rate of acceptance of all the ungrammatical double-object sentences (with the exception of the *choose* type).[6] The inter-group difference between the scores for the *deliver* and the *shout* type reached statistical significance (2.31 vs 1.38, $t=2.11$, $p=0.04$ for the *deliver* type; 1.58 vs 0.58, $t=2.46$, $p=0.02$ for the *shout* type). The high acceptance level of the grammatical double-object datives by the university students suggests that there may be a major effect of positive evidence on the acquisition of the English dative, as these are the only dative types which the subjects could have encountered in the input data.

Second, the difference between the two scores given by the university subjects for the grammatical to-double-object sentences (i.e. the *send (Mary)*

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[6] As observed in Note 5, there is disagreement among native speakers of English about the grammaticality status of double-object sentences containing the verb *choose*. Plausibly, positive evidence for such sentences had been available to the university subjects. This might be the reason why the university subjects found sentences of the *choose* type (which were considered as ungrammatical in the present study) slightly more acceptable than the secondary subjects (1.13 vs 1.00). Note that the native subjects found such sentences even more acceptable than the university subjects (1.75 vs 1.13).

type) and the grammatical for-double-object sentences (i.e. the *make* type) narrowed, the scores being 3.19 and 2.81 respectively.

Third, the university subjects significantly differentiated sentences containing native verbs from those containing Latinate verbs. The mean scores for the *send (Mary)* and *make* types of sentences were significantly higher than those for the *deliver* and *construct* types (3.19 vs 1.38, t=7.39, p=0.00; 2.81 vs 0.88, t=7.77, p=0.00).

2.2. Test 2

In order to further test the learners' sensitivity to the semantic constraint on the English double-object form, a second test was used which involved the send (school) and open (whisky) types of sentences. These sentences were different from the send (New York) and open (window) sentences, as they might, or might not, signify transfer of possession, depending on how they are seen pragmatically. For each pair of such sentences, one in the [__NP PP] form, the other in the [__NP NP] form, two situations were created (see Appendix 2.2). In one situation, the indirect object is more likely to receive a 'prospective possessor' or `beneficiary' interpretation, as in:

(10) A. John wanted to thank all the teachers at a school for their help. So,
___John sent a letter to the school.
___John sent the school a letter.
B. John wanted to drink whisky. So,
___Mary opened a bottle of whisky for John.
___Mary opened John a bottle of whisky.

In the other situation, the indirect object was likely to receive a 'location' or 'deputive' reading as in:

(11) A. John wanted to tell a friend studying at a school some news. So,
___he sent a letter to the school.
___he sent the school a letter.
B. Mary was too busy to serve a customer who wanted whisky. John would like to help Mary. So,
___he opened a bottle of whisky for Mary.
___he opened Mary a bottle of whisky.

The learners are asked to indicate whether a particular test sentence in a specified situation was acceptable, unacceptable (see Appendix 2.1.). It was

hypothesized that the learners would treat the same double-object sentence differently under the two different situations, accepting the sentence under the first situation, and rejecting the same sentence under the second.

2.2.1. Results

The results of this test are presented in Table 3. As can be seen from the table, the difference in situation had little bearing on the subjects' judgment of the sentences in the prepositional dative form, all of which received a high acceptance score. The lowest score was 3.13 for the secondary subjects; 3.31 for the university subjects; and 3.88 for the native speakers.

The contextual difference, however, affected the subjects' judgment of the sentences in the double-object form. All the sentences received a lower score when appearing in the situation involving violation of the semantic constraint (Situation 2) than when they appeared in the situation which accorded with the constraint (situation 1). For secondary subjects, the mean score for situation 2 was 0.88, but around 1.30 for situation 1. The university subjects scored approximately 0.50 in situation 2, but the figure was at least 1.06 in situation 1. Likewise, the native speakers had mean scores of 0.25 and 1.00 for situation 2, but corresponding scores of 1.13 and 2.25 for situation 1.

These results lend support to our finding in Test 1 that the subjects were sensitive to the semantic constraint on the double-object construction in English.

2.3. Test 3 and Test 4

These two tests were intended to determine whether or not the acquisition of the Order Principle together with an awareness that the verbs in B, C, E, and F in Table 1 can take the direct object alone would inform the learner that these verbs are disallowed in the double-object dative.

Information about how well the learners had acquired the Order Principle was elicited by Test 3, which consists of 30 sentences (see Appendix 3.2.). Half of them were ill-formed due to violation of the Order Principle. In each of these sentences, an obligatory complement was attached farther away from its head than an optional element, as in:

(12) a. John treated Mary (*last night) badly.
b. John received Mary's reply (*yesterday) to his letter.
c. John is fond (*in some ways) of Mary.

The other half of the test sentences were well-formed sentences, with the elements in each sentence in the right order. On the basis of Test 3, 14 subjects (11 university subjects, 3 secondary subjects) were selected from the two L2 groups. Each of these subjects rejected 12 or more of the 15 ill-formed sentences, and accepted 12 or more of the 15 well- formed sentences, and were thus considered as having a good mastery of the Order Principle.

TABLE 3

Subjects' Judgment of Prepositional and Double-object Datives in Biased Contexts

Mean Acceptance Score (Maximum=4)

Test Sentence Type	Secondary Students	University Students	Native Speakers
[__NP PP]			
Situation 1**			
send (school)	3.44	3.31	4.00
open (whisky)	3.44	3.69	3.88
Situation 2*			
send (school)	3.25	3.69	4.00
open (whisky)	3.13	3.50	4.00
[__NP NP]			
Situation 1			
send (school)	1.31	1.63	2.25
open (whisky)	1.25	1.06	1.13
Situation 2			
send (school)	0.88	0.50	1.00
open (whisky)	0.88	0.44	0.25

** Situation 1 favoured a "prospective possessor" reading for send (school) sentences, and a "beneficiary" reading for open (whisky) sentences; * Situation 2 favoured a "locative" reading for send (school) sentences, and a "deputive" reading for open (whisky) sentences.

Test 4 was introduced to see whether or not the learners accepted sentences in which the verbs in B, C, E, and F in Table 1 took only the direct object (see Appendix 4.2.). Half of the test sentences were taken from Test 1,

with the prepositional phrase dropped. So, for example, a sentence like *John delivered a letter to Mary* in Test 1 became *John delivered a letter* in this test.

Table 4

Relations between Subjects' Judgment of Single-argument Forms and Corresponding Double-object Forms (N=14)

	I**	II	III	IV
	+ [__NP]*	- [__NP]	+ [__NP]	- [__NP]
	- [__NP NP]	- [__NP NP]	+ [__NP NP]	+ [__NP NP]
Test Verb				
B. deliver	4	2	4	2
transport	2	10	0	0
display	3	4	5	0
report	8	3	0	0
C a. pull	6	4	3	0
push	10	1	3	0
lift	11	1	2	0
lower	10	1	1	0
b. shout	5	4	2	1
scream	6	5	1	1
say	11	0	3	0
E. construct	10	1	2	0
design	10	0	3	0
create	8	0	3	1
obtain	9	4	0	0
F. choose	8	0	4	0
pick	3	6	2	1

** The figures in each column indicate the number of subjects that gave a particular response in judging single-argument and double-object sentences containing the verbs listed in the left-most column.

* + = Acceptance, - = Non-acceptance

The judgment made by the 14 subjects considered as having a good mastery of the Order Principle in this test was compared with their judgment in Test 1. If these subjects accepted a sentence like *John delivered a letter*, they were assumed to regard the indirect object of that verb as optional and were

expected not to accept a double-object sentence like *John delivered Mary a letter.*

2.3.1. Results

The results of the comparison of the 14 subjects' judgment in Test 4 and Test 1 are presented in Table 4. As can be seen from the figures in column I, with regard to the verbs *deliver, transport, display, pull, shout, scream,* and *pick*, less than 50% of the subjects rejected the ungrammatical double-object sentences, though the subjects regarded these verbs as single-argument verbs.

As column II shows, on the other hand, 25% or more of the subjects (ranged from 4 to 10 for the most part) rejected the double-object datives, despite the fact that they did not accept these verbs as single-argument verbs.

In addition, as can be seen from column III, for verbs such as *deliver, display, pull, push, say, design, create,* and *choose*, at least 20% of the subjects (3 or more) accepted the double-object datives, while at the same time showing knowledge of the single-argument status of these verbs.

The results show, however, that in general subjects did not accept double-object datives if the verbs were not judged to have single arguments.

Judging from these results, there is not much evidence that subjects' rejection of ungrammatical double-object datives was related in any significant way to the acquisition of the Order Principle, and to an awareness that the verbs in those double-object datives have a single-argument status.

3. Conclusion

3.1. The semantic constraint on the English dative

The results from Test 1 and Test 2 seem to confirm Gropen et al.'s proposal that the double-object dative is inherently constrained semantically as a consequence of having the semantic structure X causes Z to have Y. This structure requires that Z should be a possessor of the direct object, but not merely a place to which the direct object moves, nor a person in whose stead someone does something. It also requires that the indirect object should be a causee, and the more directly the indirect object is involved as causee, the greater the chance for the verb to occur in the double-object dative. This explains why the secondary subjects in the present study should have exhibited a sensitivity to the semantic properties of the indirect object and the dative verbs (in judging the *send (Mary)* and *make* types of sentences as opposed to the *send (New York)* and *open (window)* types, and in judging the *send (Mary), deliver,*

and *construct* types of sentences as opposed to the *pull, shout,* and *choose* types), and why they extend the double-object dative to non- alternating dative verbs such as deliver or construct more readily than to *pull, shout,* or *choose.*

The fact that the secondary subjects judged the grammaticality of to-double-object datives relatively more accurately than for-double-object datives could also be accounted for in light of Gropen et el.'s account. Since to- dative verbs inherently signify causation of possession change, and either explicitly or implicitly require a possessor goal to which the transfer of possession is directed, grammatical to-double-object datives are compatible with the semantic structure of the double-object dative X causes Z to have Y. On the other hand, this semantic structure is extrinsically imposed on for-double-object datives such as John made Mary a cake. The verb make itself does not signify causation of possession change, and it strictly subcategorizes for only the direct object. Probably, it is because of this difference between the to- and the for- double-object datives that the secondary subjects judged the former as relatively more acceptable than the latter.

Randall's proposal, on the other hand, would have problems in explaining why the secondary subjects preferred verbs such as *deliver* or *construct* to *pull, shout,* or *choose* when overextending the double-object construction. It is unlikely that the input data available to these learners happened to have been such that they had learned about the two-place status of verbs such as *pull, shout,* or *choose* earlier than verbs such as *deliver* or *construct.*

3.2. Overgeneralization and the learnability problem

The results from Test 1 show that in judging the *send (Mary)* and *deliver* types of sentences, the secondary subjects did not differentiate between the two. The same was true of the *make* and *construct* types. Interestingly, the subjects accepted the *deliver* and *construct* sentences even slightly more than the *send (Mary)* and the *make* sentences, respectively. This clearly suggests that these subjects overgeneralized the double-object dative to dative verbs which occur only in the prepositional form.

As previously observed, overgeneralization in dative acquisition poses a learnability problem, given the assumption that negative evidence is in general not available to the learner. The results of Test 1 show that the scores given by the university subjects for all the types of ungrammatical double-object sentences (except for the choose type) were lower than the corresponding figures given by the secondary subjects. The inter-group difference between the acceptance scores for the *deliver* and *shout* types of sentences was statistically

significant. It remains to be explained why the university subjects rejected these types of sentences significantly more than the secondary subjects, assuming that they had received little or no negative evidence about the ungrammaticality of such sentences.

Recall that double-object datives containing *deliver* and *construct* types of verbs are ungrammatical because the morphophonological constraint restricts the double-object form to verbs of native origin (as opposed to verbs of Latinate origin). It is plausible that the university subjects rejected the *deliver* and *construct* sentences significantly more than the secondary subjects because, on the basis of the input data, they had developed a sensitivity to the native/Latinate distinction in the English vocabulary, and had realized that such a distinction had a bearing on the (un-)grammaticality of double-object datives. However, such an account would become more convincing if we could establish that there is some sort of correlation between the development of an awareness of the native/Latinate morphophonological distinction in the language and the rejection of double-object datives containing Latinate verbs such as *deliver* or *construct*.

The semantic and morphophonological criteria do not explain, however, why the university subjects also rejected ungrammatical double-object sentences containing exceptional native verbs such as *pull* and *shout* more than the secondary subjects. The morphophonological constraint is not relevant here, and these verbs pertain to the general event of causation of transfer (though unlike canonical dative verbs such as *give* or *send*, they may involve the indirect object as causee less directly). It is not clear whether the university subjects had a stricter requirement on the directness of the dative verb's involvement of the indirect object as causee than the secondary subjects, or other acquisitional factors are at work.

The results from Test 3 and Test 4 do not show that good mastery of the Order Principle and recognition of the two- place status of non-alternating dative verbs relate in any significant way to the learners' (non-)acceptance of ungrammatical double-object sentences containing non- alternating dative verbs.

A potential solution to the above problem could perhaps be found in the Uniqueness Principle proposed by Wexler (see Roeper 1981), which requires that in the unmarked case every deep form has a single surface structure in syntax, unless there is positive evidence to the contrary. Roeper (ibid.) transposes this principle to the lexicon, arguing that in the unmarked case each functional structure for a verb has a single subcategorization structure, and that if there is more than one subcategorization for a function, it is marked and written on a separate line of subcategorization.

Tentatively, I propose that after encountering a number of dative verbs such as *give* or *send* occurring in both prepositional and the double-object structure in the input data, the learner acquires the semantic structure for the double-object dative via the 'near-universal linking rules' that map thematic roles to syntactic positions (as has been proposed by Gropen et al.). On semantic grounds, the learner might then use, to a greater or lesser degree, any verb in the double-object dative which is semantically consistent with the semantic structure for the double-object dative, including verbs such as *deliver, pull,* or *shout*. At this stage, semantic factors override the requirement of the Uniqueness Principle. As a result, overgeneralizations of the double-object dative occur. However, as the learner observes the function of causation of possession change for these verbs persistently expressed by the prepositional dative in the input data, the learner would gradually drop the corresponding ungrammatical double-object form, in accordance with the Uniqueness Principle. In the present study, the generally greater rejection of ungrammatical double-object datives by the university subjects may reflect an operation of the Uniqueness Principle.

References

Baker, C.L. (1979). 'Syntactic theory and the projection problem', *Linguistic Inquiry* 10:533-581.

Bley-Vroman, R. (1989). 'What is the logical problem of foreign language learning?' in *Linguistic Perspectives on Second Language Acquisition*, ed. by S.M. Gass & J. Schachter, 41-68. Cambridge University Press.

Bowerman, M. (1987). 'The "no negative evidence" problem: how do children avoid constructing an overly general grammar?' in *Explaining Language Universals*, ed. by John A. Hawkins, 73-101. Oxford: Basil Blackwell.

_____ (1990). 'Mapping thematic roles onto syntactic functions: are children helped by innate linking rules?' *Linguistics* 28:1253-1289.

Goldsmith, J. (1980), `Meaning and mechanism in grammar', in *Harvard Studies in Syntax and Semantics* III, ed. by S. Kuno, 423-449. Cambridge, MA: Harvard University Linguistics Department.

Green, G.M. (1974). *Semantics and Syntactic Regularity*. Bloomington: Indiana University Press.

Gropen, J., S. Pinker, M. Hollander, R. Goldberg, R. Wilson (1989). 'The learnability and acquisition of the dative alternation in English', *Language* 65:203-256.

Hawkins, R. (1987). 'Markedness and the acquisition of the English dative alternation by L2 speakers', *Second Language Research* 3:21-55.

Jackendoff, R. (1977), *X-bar Syntax: A Study of Phrase Structure*. Cambridge,MA: MIT Press.

Le Compagnon, B. (1984), `Interference and overgeneralization in second language learning: the acquisition of English dative verbs by native speakers of French', *Language Learning* 34, No.3:39-67.

Mazurkewich, I. (1984), `The acquisition of the dative alternation by second language learners and linguistic theory', *Language Learning* 34, No.1:91-109.

Mazurkewich, I. and L. White (1984), `The acquisition of the dative alternation: unlearning overgeneralizations', *Cognition* 16:261-283.

Methold, K. and J. Tadman (1986a), *Integrated English*. Hong Kong: Longman Group (Far East) Ltd.

_____ (1986b), *Trend*. Hong Kong: Longman Group (Far East) Ltd.

Oehrle, R. (1976), *The Grammatical Status of the English Dative Alternation*. Ph.D. dissertation, MIT.

Randall, J.H. (1987), *Indirect Positive Evidence: Overturning Overgeneralizations in Language Acquisition*. Bloomington: Indiana University Linguistics Club.

_____ (1990), `Catapults and pendulums: the mechanics of language acquisition', *Linguistics* 28:1381-1406.

Roeper, T. (1981), `On the deductive model and the acquisition of productive morphology', in *The Logical Problem of Language Acquisition*, ed. by C. Baker & J. McCarthy, 129- 150. Cambridge: MIT Press.

Rutherford, W.E. (1975), *Modern English*. New York: Harcourt Brace Jovanovich.

Stowell, T. (1981), *Origins of Phrase Structure*. Ph.D. dissertation, MIT.

Swan, M. (1980), *Practical English Usage*. Oxford: The English Language Book Society and Oxford University Press.

White, L. (1987), `Children's overgeneralizations of the English dative alternation', in *Children's Language* Vol.6, ed. by K. Nelson and A. van Kleeck, 261-287. Hillside, NJ:Lawrence Erlbaum.

_____ (1989), `Second language acquisition and universal grammar', *Studies in Second Language Acquisition* 12:121- 133.

Appendix 1

1.1. Instructions for Test 1

In English, there are verbs which take two objects (a direct object and an indirect object), as in:

(1) John gave a book to Mary.
(direct object) (indirect object)

In some cases the preposition before the indirect object may be *for*, as in:

(2) John painted a picture for Mary.

The direct and indirect object in the above sentences may appear in another order:

(3) John gave Mary a book.
(4) John painted Mary a picture.

Here, the indirect object precedes the direct object, and there is not any preposition before the indirect object.

English also has some verbs which take two objects, but which allow them to appear only in the order shown by sentences (1) and (2), as in:

(5) a. John described the film to Mary.
b. *John described Mary the film.

Sentence (5a) is grammatical, but (5b) is ungrammatical.

Now please read the following sentences. Put a ✓ next to any sentence if you think the two objects in that sentence appear in an order acceptable to you, and put a X nest to any sentence if you think the order of the two objects is not acceptable to you, and put a ? next to any sentence if you are not sure whether the order is acceptable or not. Your first decision is important to us. Please do not change any of your answers. Thank you for your cooperation.

1.2. Test sentences for Test 1

A. a. *send (Mary)* sentences

send
John sent a letter to Mary.
John sent Mary a letter.

ship
John shipped a car to Mary.
John shipped Mary a car.

bring
John brought a gift to Mary.
John brought Mary a gift.

cable
John cabled a message to Mary.
John cabled Mary a message.

b. *send (New York)* sentences

send
John sent a letter to New York.
*John sent New York a letter.

ship
John shipped a car to New York.
*John shipped New York a car.

bring
John brought a gift to the classroom.
*John brought the classroom a gift.

cable
John cabled a message to New York.
*John cabled New York a message.

c. *send (school)* sentences

send
John sent a letter to the school.
?John sent the school a letter.

ship
John shipped a car to the company.
?John shipped the company a car.

bring
John brought a dog to the farm.
?John brought the farm a dog.

cable
John cabled a message to the TV station.
?John cabled the TV station a message.

B. *deliver* sentences

deliver
John delivered a letter to Mary.
*John delivered Mary a letter.

transport
John transported a car to Mary.
*John transported Mary a car.

display
John displayed a picture to Mary.
*John displayed Mary a picture.

report
John reported an accident to the police.
*John reported the police an accident.

Ca. *pull* sentences

pull
John pulled a box to Mary.
*John pulled Mary a box.

push
John pushed a table to Mary.
*John pushed Mary a table.

lift
John lifted a suitcase to Mary.
*John lifted Mary a suitcase.

lower
John lowered a bucket to Mary.
*John lowered Mary a bucket.

Cb. *shout* sentences

shout
John shouted the news to Mary.
*John shouted Mary the news.

scream
John screamed the news to Mary.
*John screamed Mary the news.

say
John said something to Mary.
*John said Mary something.

D. *make* sentences

make
John made a cake for Mary.
John made Mary a cake.

find
John found a room for Mary.
John found Mary a room.

build
John built a house for Mary.
John built Mary a house.

sing
John sang a song for Mary.
John sang Mary a song.

E. *construct* sentences

construct
John constructed a house for Mary.
*John constructed Mary a house.

design
John designed a dress for Mary.
*John designed Mary a dress.

create
John created a magic box for Mary.
*John created Mary a magic box.

obtain
John obtained a ticket for Mary.
*John obtained Mary a ticket.

F. *choose* sentences

choose
John chose a dress for Mary.
*John chose Mary a dress.

pick
John picked a cake for Mary.
*John picked Mary a cake.

G. a. *open (window)* sentences

open
John opened a window for Mary.
*John opened Mary a window.

wash
John washed a shirt for Mary.
*John washed Mary a shirt.

weigh
The nurse weighed a baby for the doctor.
*The nurse weighed the doctor a baby.

pack
John packed a suitcase for Mary.
*John packed Mary a suitcase.

b. open (whisky) sentences

open
John opened a bottle of whisky for Mary.
?John opened Mary a bottle of whisky.

wash
John washed some apples for Mary.
?John washed Mary some apples.

weigh

John weighed some bananas for Mary.

?John weighed Mary some bananas.

pack

John packed a cake for Mary.

?John packed Mary a cake.

Appendix 2

2.1. Instructions for Test 2

Please complete each of the following sentences. If you think both of the choices given under each of the following sentences can be used to complete the sentence, put a ✓ next to each of the two choices; if you think only one of the two choices can be used, put a ✓ next to the one which think can be used; if you think neither of the choices can be used, put a X next to each of the two choices. Your first decision is important to us. Please do not change any of your answers. Thank you for your cooperation.

2.2. Test sentences for Test 2

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To-dative

1. John wanted to tell a friend studying at a school some news. So,
___John sent a letter to the school.
___John sent the school a letter.
2. John wanted to thank all the teachers at a school for their help. So,
___John sent a letter to the school.
___John sent the school a letter.
3. John wanted to give a gift to a friend working in a company abroad. So,
___John shipped a car to the company.
___John shipped the company a car.
4. John would like to give a gift to a company abroad. So,
___John shipped a car to the company.
___John shipped the company a car.
5. John wanted to take a walk with a dog on a farm. So,
___John brought a dog to the farm.
___John brought the farm a dog.

6. John's friend, Peter, once wanted to have a watch-dog on his farm. So,
___John brought a dog to the farm.
___John brought the farm a dog.
7. John wanted to let a friend working at a TV station know something. So,
___John cabled a message to the TV station.
___John cabled the TV station a message.
8. John discovered something important which he wanted everyone in the city to know. So,
___John cabled a message to the TV station.
___John cabled the TV station a message.

For-dative

1. Mary was too busy to serve a customer who wanted whisky. John would like to give Mary some help. So,
___John opened a bottle of whisky for Mary.
___John opened Mary a bottle of whisky.
2. John wanted to drink whisky. So,
___Mary opened a bottle of whisky for John.
___Mary opened John a bottle of whisky.
3. Mary had to many apples to wash. John wanted to help her. So,
___John washed some apples for Mary.
___John washed Mary some apples
4. Mary need some clean apples to give to her children. So,
___John washed some apples for Mary.
___John washed Mary some apples.
5. Mary had a lot of bananas to weigh. John wanted to help Mary. So,
___John weighed some bananas for Mary.
___John weighed Mary some bananas.
6. Mary came to John's store. She liked the bananas there. So,
___John weighed some bananas for Mary.
___John weighed Mary some bananas.
7. Mary did not have the time to pack a cake for her customer. John came to help. So,
___John packed a cake for Mary.
___John packed Mary a cake.
8. Mary came to John to buy a cake. So,
___John packed a cake for Mary.
___John packed Mary a cake.

Appendix 3

3.1. Instructions for Test 3

English has certain requirements on the order in which sentence elements may appear in a sentence. For example, a sentence like:

(1) John is a science full-time student at the Chinese University.

is ungrammatical. Its grammatical form should be:

(2) John is a full-time science student at the Chinese University.

Now, please read the following sentences. Put a ✓ next to any sentence if you think the order of the sentence elements in that sentence is acceptable to you, and put a X next to any sentence if you think the order is not acceptable to you, and put a ? next to any sentence if you are not sure whether the order is acceptable or not. Your first decision is important to us. Please do not change any of your answers. Thank you for your cooperation.

3.2. Test sentences for Test 3

Violation of the Order Principle

Verb + Complement

1. John treated Mary (*last night) badly.
2. John will put the books (*himself) on the table.
3. John invited (*to the party) Mary.
4. John hit (*with a hammer) the nail.
5. John laughed (*at the meeting) at Mary.

Noun + Complement

1. John received Mary's reply (*yesterday) to his letter.
2. There was an attack (*at the meeting) on the Prime Minister.
3. John is a student (*from Hong Kong) of chemistry.
4. The loss (*two years ago) of a ship in a storm cost the company a lot of money.
5. John was wounded in his fight (*after the match) with Bill.

Adjective + Complement

1. John is fond (*in some ways) of Mary.
2. John was dependent (*for many years) on Mary.
3. John is good (*in exams) at cheating.
4. John is proud (*completely) of himself.
5. John is interested (*without any good reasons) in cooking Indian food.

Normal Sentences

1. It rained heavily last night.
2. John attacked Bill by mistake.
3. John spent a lot of money on drink.
4. John wrote a letter to a Cambridge physics professor.
5. John would like to hear something interesting.
6. John got very angry with Bill at the meeting.
7. John is tired of tennis completely.
8. John would not be ready for the game for sometime.
9. John never saw so beautiful a picture.
10. John will put the books on the table himself.
11. John invited Mary to the party.
12. John is a student of chemistry from Hong Kong.
13. The loss of a ship in a storm two years ago cost the company a lot of money.
14. John is interested in Indian food without any good reasons.
15. John is good at cheating in exams.

Appendix 4

4.1. Instructions for Test 4

In English, there are sentences which can take only one sentence element after the verb, as in:

(1) John broke a window.

However, there are also sentences which must take two or more than two sentence elements. For example, a sentence like the following:

(2)*John put a book.

is ungrammatical, as it must take an element after a book which indicates a location. If we add such an element to (2), we get a grammatical sentence:

(3) John put a book on the table.

All the following sentences take only one sentence element after the verb. Please read these sentences. Put a ✓ next to any sentence if you think it is acceptable to you, and put a X next to any sentence if you think it is not acceptable to you, and put a ? next to any sentence if you are not sure whether it is acceptable or not. Your first decision is important to us. Please do not change any of your answers. Thank you for your cooperation.

4.2. Test sentences for Test 4

Non-alternating Verb + Single NP

1. John delivered a letter.
2. John displayed a picture.
3. John transported a car.
4. John reported an accident.
5. John constructed a house.
6. John designed a dress.
7. John created a magic box.
8. John obtained a ticket.
9. John pulled a box.
10. John pushed a table.
11. John lifted a suitcase.
12. John lowered a bucket.
13. ?John shouted the news.
14. ?John screamed the news.
15. John said something.
16. John chose a dress.
17. John picked a cake.

Alternating Verb + Single NP

1. ?John sent a letter.
2. ?John shipped a car.
3. ?John brought a dog.
4. ?John cabled a message.
5. John made a cake.
6. John found a house.
7. John built a house.
8. John sang a song.
9. ?John gave a book.
10. ?John told a story.
11. ?John showed a picture.
12. *John handed a cup to tea.
13. *John lent a bike.
14. ?John passed a ball.
15. John taught English.
16. John kicked a ball.
17. John wrote a letter.

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The Learnability of Locality Conditions on Quantification[1]

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0. Introduction

In this paper, I will discuss empirical findings from the first language acquisition of Mandarin Chinese suggesting that certain properties of the logical form of natural language are not learned from experience. These unlearnable properties appear to manifest themselves in the child's linguistic knowledge as soon as prerequisite conditions are met.

Because of inherent difficulties in the developmental study of quantification, the child langauge data I am reporting will not confirm the innateness of the logical form properties at issue in a direct way. The evidence, however, is highly indicative of early acquisition of these linguistic properties, which are underdetermined by the data the child is exposed to.

This study is intended as a contribution to the study of linguistic universals. As it was conceived on the assumptions of generative grammar, I would like to begin by placing the study in the broader context of the Chomskyan theory of linguistic universals.

1. Chomsky's view of linguistic universals

The potential epistemological significance of Chomskyan linguistics lies in the rich array of concrete candidates for linguistic universals it has proposed in the past thirty years. The universals actively pursued in the paradigm are universals in a specific sense. They are principles that partially characterize the innate mental structures of the individual; they constitute the initial state of the linguistic component of the mind. These universals may also be thought of as representations of biological properties of the brain at some level of abstraction (Chomsky 1980:31, 1986:23, 1988:7-8).

The postulation of linguistic universals is necessitated by consideration of the disparate gap between the wealth and complexity of the individual's linguistic knowledge on the one hand, and the poverty of the data the individual has access to in the course of his language development. Only by imputing to the child a rich innate mechanism can language acquisition be explicable.

Further, these universals are assumed to be specific to the linguistic faculty of the mind, and may not be derivable from principles of other

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[1]An earlier version of this paper was read at the Conference on Analytic Philosophy & Linguistic Philosophy held at the Chinese University of Hong Kong on March 7-12, 1991. I am indebted to Norman Freeman, Steve Matthews and Virginia Yip for valuable comments on the earlier draft. Needless to say, the faults that remain are mine.

cognitive domains. For example, while some principle may underlie the human ability to arrange an array of hollow boxes according to size, so that smaller boxes are contained within larger ones, cognitive principles such as this may not have a direct link to seemingly parallel linguistic capacities such as the ability to embed a phrase within another. [2]This emphasis on the language-specific nature of universals is a central feature of Chomsky's conception of universals, and distinguishes it from alternative theories such as those proposed by Piaget (see Piaget & Inhelder 1969, Piatelli-Palmarini 1980).

Given these biologically endowed linguistic principles, language acquisition may proceed in a highly deterministic manner, using the minimal information provided by experience. 'Knowledge of language' is thus said to 'grow in the brain'; it just 'happens to us'.[3] Acquiring the grammar of a language is seen as a process of setting the parameters stated in terms of the linguistic universals. The values of the parameters are set on the basis of data from the particular language concerned. The process can be likened to the setting of switch positions on a battery, so that each combination of settings will yield the core grammatical properties of a natural language (cf. Chomsky 1986:146). Examples of these parameters that have emerged in the literature include the relative order of the head to the other constituents in the phrase (the word order parameter, cf. Stowell 1981)); the possibility for non-overt noun phrases to occur in subject position of finite clauses in languages such as in Chinese or Italian (the pro-drop parameter, cf. Hyams 1986); differences in the scope of the domains in which the Binding Principles of Chomsky (1981) hold (the Governing Category Parameter, cf. Manzini & Wexler 1987).

In this view, linguistic universals are not necessarily properties common to all languages. In fact, properties common to all languages may have only accidental interest if they can be acquired from exposure to language data. For example, while the hierarchical structure of sentences cannot be learned from experience, the possibility that all languages have words for 'sun' and 'moon' can be accounted for by the presence of these planets in the experience of all speech communities. The former will count as a candidate for a linguistic universal, whereas the latter is of trivial

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[2] See Greenfield (1978) for a illustrative example of an experimental attempt to establish parallels between general cognitive abilities and linguistic competence.

[3]'knowledge of language' here means tacit knowledge of language. It is assumed that speakers have internalized in their brain a grammar of their language. Such knowledge can be demonstrated in the form of speaker judgments of ambiguity and anomaly of sentences as well as paraphrase or inconsistency relations of sentences. I will not go into the criteria for establishing knowledge such as those proposed in the literature, e.g. recognition and justification (cf. Nagel 1974). Nor will I explore rival views on the mental grammar (cf. the Platonist conceptions of Katz 1981). In any case, whether one accepts these regularities as mental representations of the speaker should not affect the substance of the empirical findings in this paper.

interest.

Nor is it the case that linguistic properties present in the initial state of the individual are immutable and cannot be changed in the course of development. Such changes are permissible as long as the data encountered by the child are sufficiently rich to warrant such alterations.

Consider the well known fact that a constituent within a relative clause modifying a noun cannot be questioned for a variety of languages (cf. Ross 1967). This is attributed to a constraint known as the Complex Noun Phrase Constraint (CNPC). Thus a contrast may be observed between (1a-b) and (1c-d). Corresponding to a sentence such as (1a), one may have a question such as (1b) in which the object of the preposition "on" is questioned. However, the object of the same preposition in (1c), which is contained within the complex noun phrase "a dog who is gnawing on..." cannot be questioned, as can be seen from the ungrammaticality of (1d).

(1a) The dog is gnawing on a bone.
(1b) What is the dog gnawing on __?
(1c) I see a dog [who is gnawing on a bone].
(1d) *What do I see a dog [who is gnawing on ___]?

The CNPC does not appear to be a linguistic property learned from experience. If children were to induce this from the languge data they are exposed to, they would need to have access not only to sentences such as (1b), but also information about the ungrammaticality of sentences like (1d). Given the fact that negative data (i.e. data informing the learner that certain sentences of the language are ungrammatical) are generally absent from normal language acquisition, this scenario seems unlikely. Experimental studies carried out with English-speaking children (cf. Otsu 1981) have also demonstrated early sensitivity to the CNPC.

While assumption of a condition like the CNPC may be part of the initial language learning apparatus of the child, these initial assumptions can be revised if the data available to the child contradict them. In this connection, it should be noted that the Swedish counterpart of (1d), given in (1e), is said to be grammatical (Allwood 1982:17).

(1e) Vad ser jag en hund som gnager pa?
what see I a dog who is-gnawing on
"What do I see a dog who is gnawing on?"

In such a case, one might still posit the impossibility of questioning something within a relative clause as an innate given. Speakers of Swedish are special in that positive evidence from their language will lead them to revise this initial assumption about the possibilities of questioning, whereas such revision will not be necessary for speakers of other languages.

2. Locality Principles as a type of linguistic universal

The linguistic universals germane to the present study are constraints similar to the CNPC, which govern the well-formedness of linguistic representations at particular levels of grammar. These constraints are also known as locality principles. Essentially, locality principles require that elements moved from a particular position must not be too distant from the

latter. The relationship between the moved element and the position left behind must be in some sense 'local'.

The example below illustrates another locality condition on syntax besides the CNPC. This constraint, known as the wh-island condition, prohibits a question phrase from moving outside an interrogative complement of a clause.

(3) John wondered [*what* Mary bought _].
(4) **What* did John wonder [who bought _]?

Assume that the above sentences are derived by moving the wh-phrase *what* from the object position of *bought* in the complement clause of *wonder*. While *what* can move to the initial position of the complement clause in (3), it cannot go beyond the interrogative complement to the initial position of the main clause in (4).

As explained in the preceding section, these locality constraints cannot be learned from experience, because the language data are too impoverished to allow for induction of the relevant principles.

3. Locality Principles on Logical Form

Locality principles have also been proposed for the level of Logical Form (LF). Before we look at these principles, a characterization of this level of LF is in order. In the current version of syntactic theory known as Government Binding theory (GB), the level of LF is defined by the rule of Quantifier Raising (QR), which attaches quantificational NPs such as *every N, a N, two N* to an S node of the sentence (May 1977, 1986). Thus, corresponding to (5) below, the LF representations are (5a) and (5b) respectively.

(5) *Every child* sits on *a plate*.
(5a) [*Every child*$_x$ [*a plate*$_y$ [x sits on y]]
(5b) [*A plate*$_y$ [*every child*$_x$ [x sits on y]]

(5a) gives the reading in which *every child* has scope over *a plate*: for every child there is a plate such that he sits on it; different children may sit on different plates. On the other hand, (5b) gives the interpretation in which *a plate* has scope over *every child*: there is a plate such that every child sits on it. The level of LF in GB can be seen as a level of representation in which scope ambiguity of Quantifier phrases is primarily resolved structurally. The LF representations are derived from surface structures via non-overt movement.[4]

A strong argument for the postulation of LF is the striking parallels

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[4]Alternative formulations of quantifier scope are of course possible. For example, scope ambiguity is not represented configurationally but procedurally in Montague semantics (see Dowty, Wall and Peters 1981). Again the phenomenon of relative scope and clauseboundeness of scope must be acknowledged irrespective of the theoretical apparatus one uses to capture them.

between overt movement in syntax (from D-structure to S-structure) and non-overt movement in LF (from S-structure to LF representation). Thus, for example, just as a wh-phrase cannot be coreferential with a pronoun it crosses in syntax, so a quantifier phrase such as *everyone* cannot bind a pronoun it crosses in LF.

Consider the difference between (6a) and (6b). The former can be understood with the pronoun *he* functioning as a bound variable, as in (6c). However, the bound variable reading of the pronoun in (6b), as given in (6d), is not well-formed. The impossibility of a bound variable reading in (6b) correlates with the movement of the wh-phrase over a pronoun in the sentence.

(6a) *Who*$_i$ betrayed [the woman *he*$_i$ loved]?
(6b) **Who*$_i$ did [the woman *he*$_i$ loved] betray _ ?
(6c) For which x=person, x betrayed the woman x loved.
(6d) *For which x=person, the woman x loved betrayed x.

A parallel distinction can be observed in the pair of sentences (7a-b). (7a) can be interpreted with the pronoun serving as a bound variable, as indicated in (7c). However, this interpretation is ruled out for (7b), as evidenced by the ill-formed representation in (7d).

(7a) *Everyone*$_i$ betrayed [the woman *he*$_i$ loved].
(7b) *[The woman *he*$_i$ loved] betrayed *everyone*$_i$.
(7c) For all x=person, x betrayed the woman x loved.
(7d) *For all x=person, the woman x loved betrayed x.

This parallel may be captured if one conceives of a movement process such as Quantifier Raising in the mapping between S-structure and LF. Viewed this way, movement of the wh-phrase in syntax in (6a) and movement of *everyone* in LF in (7a) do not involve crossing of the pronoun *he*. Therefore, the latter can be understood as a variable bound by the respective quantificational elements. In contrast, such movement in (6b) and (7b) involves crossing the pronoun. Thus *he* cannot be interpreted as a bound variable in these sentences (Chomsky 1976, 1980).

Another striking parallel between syntax and LF concerns the locality conditions. Just as a phrase cannot be moved from inside a relative clause to a non-local position in syntax, so a quantifier phrase cannot be raised beyond the complex noun phrase containing the relative clause in LF (cf. Rodman 1976, May 1977, Hornstein 1984).

(8) The cake [that *every child* is eating] sits on *a plate*.
(8a) [*A plate*$_y$ [the cake [that *every child*$_x$ [x is eating]]] sits on y]
(8b) *[*Every child*$_x$ [*a plate*$_y$ [the cake [that x is eating]] sits on y]]

(9)	[*meige*	*xiaohai*$_x$	dou	zai	chi] de	dangao	fang	zai	*yige*	*diezi*	shang
	every	child	all	ASP	eat NOM	cake	put	at	one	plate	on

(ASP=aspect marker; NOM=nominalizer)

Unlike *every child* in (5), the effect of the universal quantifier in (8) cannot extend beyond the relative clause to have scope over the existential quantifier in the main clause. Thus while one may understand the sentence as meaning "there is a plate such that the cake that is being eaten by every

child sits on it", one cannot take the sentence to mean "for every child x, there is a plate such that the cake that x is eating sits on it." In other words, (8a) is a legitimate LF representation, but not (8b). In (9), the Chinese counterpart of (8), the same facts obtain. The universal quantifier in the relative clause *meige xiaohai* 'every child' cannot take scope over the existential quantifier in the main clause *yige diezi* 'a plate'.[5]

We assume that this locality condition on quantifier interpretation is unlearnable and may be hypothesized as one of the linguistic properties that characterize the initial state of the individual. If this is true, one may expect this property to manifest itself as soon as the learner is capable of coping with complex structures of the type illustrated by (8-9).

4. Acquisition of LF properties

What kind of knowledge is required of the child to interpret sentences such as (5) and (8-9) correctly? At least three kinds of knowledge are necessary. First, the child must have some means of representing the relative scope of quantificational elements such as wh-phrases and quantifier noun phrases. In our framework, this is captured by the rule of Quantifier Raising. Second, the learner must know the principles for interpreting the relative scope of quantificational elements for his/her particular language. Languages may differ in their scope interpretation principles. For instance, a language like English does not base scope relations uniquely on the relative position of quantificational elements at surface structure. Thus sentences like (5) and (10) allow either of the quantifier phrases to take scope over the other. However, in languages such as Chinese, scope relations are in most cases uniquely mapped from surface structure properties (Xu and Lee 1989). Thus the Chinese counterpart of (10), given as (11), is unambiguous with only the wide scope reading of the existential quantifier.

(10) *A child* sits on *every plate*.
(10a) [*A child*$_x$ [*every plate*$_y$ [x sits on y]]
(10b) [*Every plate*$_y$ [*a child*$_x$ [x sits on y]]

(11) (you)	*yige*	*xiaohai*	zuo	zai	*meige*	*diezi*	shang
(exist)	one	child	sit	at	every	plate	on

"A child sits on every plate"

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[5]It has been observed (cf. Farkas 1981, Hornstein 1984) that the locality conditions governing quantifier interpretation in sentences such as (8b) are not identical to the CNPC. A tensed clause is sufficient to establish an opaque domain for universal quantifiers. Thus, the sentence below cannot be understood with *everyone* having scope over *a girl*.

(a) *A girl* said [that *everyone* should attend the party].

In this paper, while discussion of locality conditions will center around sentences with quantifiers embedded in relative clauses, we shall assume that it is the tensed clause that is blocks quantification.

In order for children to properly interpret relative scope in a particular language, they need to establish these language-specific scope principles at some point in their language acquisition. Thirdly, children need to be equipped with knowledge of unlearnable conditions such as the clauseboundedness constraint on quantification illustrated in (8-9).

Various accounts have been proposed to address the question how variable binding operations are acquired. A well known proposal is the essentially behaviorist explanation given by Quine (1974), who attributes the source of knowledge of variables to categorial sentences of the form "Every A is B" and "An A is B" and substitutional quantification in relative clauses. Another proposal (Hornstein 1984) considers the possibility that children start out by assuming all noun phrases to be quantifiers. Empirical investigations have been conducted on the scope principles children use to interpret relative scope in different languages (Lee 1986, in press, Chien and Wexler 1989). The experimental findings I am reporting here relate to the third issue: to what extent do young children observe the locality conditions on logical form?

5. Experiment on Clauseboundedness of Quantification

5.1 Procedure and subjects

The purpose of the experiment was to see if Chinese children's interpretation of the relative scope of quantifier phrases observes the clauseboundedness constraint on quantification. A picture identification task and an act-out task related to quantification were carried out on 61 Mandarin-speaking children and 12 adults in Beijing. There were 12 four-, five-, six- and eight-year-olds, and 13 seven-year-olds. As a separate experiment, another act-out task testing the subjects' understanding of sentences containing relative clauses was also administered (cf. Lee to appear). Care was taken to ensure that half of the subjects in each age group fell into the first six months of the age, while the other half of the group belonged to the latter six months.

For the quantification study reported here, each child subject was interviewed by two experimenters for around 30 minutes. Test sentences were recorded on an audiotape, which was played to the child. In the picture identification task, the child was asked to point at one of two pictures according to his/her understanding of a test sentence (cf. Fig. 1). In the act-out task, the child was asked to manipulate toy objects according to his/her understanding of a test sentence (cf. Fig. 2).

5.2 Test Sentences

The purpose of the experiment necessitates the use of two quantifiers in separate clauses, and therefore the use of complex sentences. The test sentences used were left-branching structures with the subject of the main

clause modified by a relative clause, as in (12-15).[6]

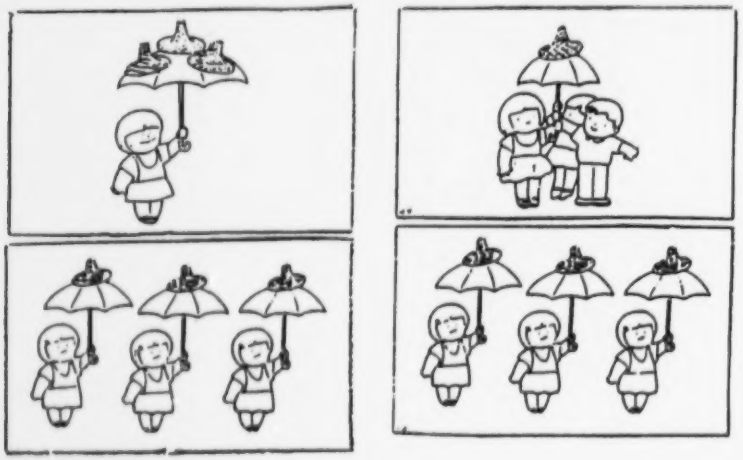

Fig. 1(a) Fig. 1(b)

Fig. 1 Pictures for Picture Identification Task

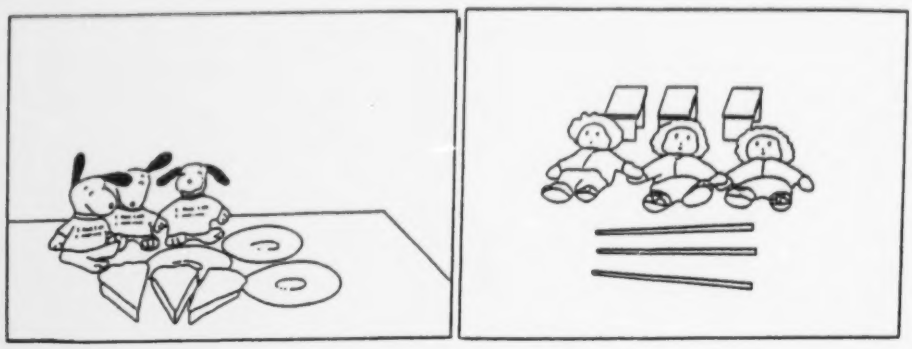

Fig. 2(a) Fig. 2(b)

Fig. 2 Prop Settings for Act-Out Task

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[6]In theory, a more direct test of the clauseboundedness constraint on quantification is to use test sentences involving simple verbal complements, such as (a) in the preceding footnote. However, these sentences generally involve verbs of communication in the main clause. This makes it extremely difficult to design act out tasks.

Representative test sentences for picture identification (cf. Fig. 1)

(12a) [_ nazhe *meiba yusan*] de xiaohai zhan zai *yige dengzi* shang
carry every umbrella NOM child stand at one stool on
"The child [who is carrying every umbrella] is standing on a stool"
[Type I, AE order]

(12b) [_ nazhe *yiba yusan*] de xiaohai zhan zai *meige dengzi* shang
carry one umbrella NOM child stand at every stool on
"The child [who is carrying an umbrella] is standing on every stool"
[Type I, EA order]

(13a) [*meige ren* dou nazhe_] de yusan dingzhe *yiding maozi*
every person all carry NOM umbrella support one hat
"The umbrella [that everyone is carrying] is supporting a hat"
[Type II, AE order]

(13b) [*yige ren* nazhe_] de yusan dingzhe *meiding maozi*
one person carry NOM umbrella support every hat
"The umbrella [that someone is carrying] is supporting every hat"
[Type II, EA order]

Representative test sentences for act-out (cf. Fig. 2)

(14a) [_ nazhe *meige kuaizi*] de xiaohai zhan zai *yige dengzi* shang
carry every chopstick NOM child stand at one stool on
"The child [who is carrying every chopstick] is standing on a stool"
[Type I, AE order]

(14b) [_ nazhe *yige kuaizi*] de xiaohai zhan zai *meige dengzi* shang
carry one chopstick NOM child stand at every stool on
"The child [who is carrying a chopstick] is standing on every stool"
[Type I, EA order]

(15a) [*meige xiaogou* dou zai chi] de dangao fang zai *yige diezi* shang
every puppy all ASP eat NOM cake put at one plate on
"The cake [that every puppy is eating] is put on a plate"
[Type II, AE order]

(15b) [*yige xiaogou* zai chi] de dangao fang zai *meige diezi* shang
one puppy ASP eat NOM cake put at every plate on
"The cake [that a puppy is eating] is put on every plate"
[Type II, EA order]

Several remarks are in order about the design of the test sentences. First of all, it should be observed that in (12) and (14), the subject of the main clause also functions as the subject in the relative clause. These will be referred to as Type I sentences. However, in (13) and (15), the subject of the main clause functions as the object of the relative clause. These sentences will be called Type II sentences. Because of this, the quantifier phrase within the relative clause appears in object position in Type I sentences, but in subject position in Type II sentences.

Secondly, as can be seen from the test sentences, corresponding to each relative clause structure (e.g. (12, 14) vs (13, 15)), two quantifier orderings were used, one with the universal quantifier in the relative clause and the existential quantifier in the main clause (henceforth referred to as the AE order), another with the existential quantifier in the relative clause and the universal quantifier in the main clause (henceforth EA order). Two

test sentences were used for each combination of relative structure and quantifier ordering, yielding a total of 8 test sentences for either of the two tasks. In sum, a total of 16 test sentences were used for the data reported here.

5.3 Possible interpretations of the test sentences

To determine whether the child obeys the locality condition on quantification in interpreting the test sentences, two preconditions must be met. One is that the child must interpret the test sentences as complex sentences. If the child were to reanalyze these sentences as having a different structure, then their responses will not be reliable indicators of adherence to or violation of the locality constraints.

Secondly, one has to ensure that the child is interpreting the quantifier phrases as quantifiers and not referring expressions. This point is particularly pertinent to the child's interpretation of indefinite noun phrase of the form *a N*. These noun phrases may be interpreted as quantificational elements, in which case they function as existential quantifiers. At the same time, they may be understood referentially, in which case they are not quantifiers but referring expressions. In the latter situation, the data will not bear on the issues being investigated.

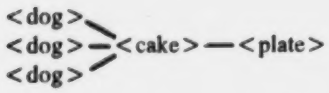

Fig. 3(a) singular bounded reading

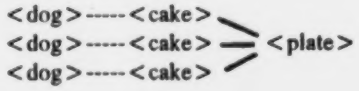

Fig. 3(b) plural bounded reading

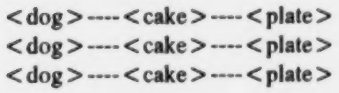

Fig. 3(c) *unbounded reading

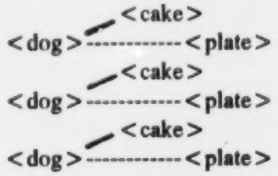

Fig. 3(d) conjoined reading

Fig. 3 Possible interpretations of a Type II test sentence with AE order:
[*meige xiaogou* dou zai chi] de dangao fang zai *yige diezi* shang
every puppy all ASP eat NOM cake put at one plate on
"The cake [that every puppy is eating] is put on a plate"

Because of the above considerations, it is argued that the crucial data for our analysis should come from sentences of the AE order, ie. the (a) sentences of (12-15) in which the universal quantifier resides in the relative clause and the existential quantifier in the main clause. In contrast, as I will explain below, the (b) sentences of (12-15) will not provide useful information about the issue being investigated.

How will children interpret a sentence such as (15a)? Their interpretation will depend on the structural description they assign to it. Assuming the child correctly assigns the relative clause structure to (15a),

we may have the interpretations diagrammed in Fig. 3(a) and Fig. 3(b) both of which are consistent with the locality condition. The child may assign a reading in which he interprets the subject of the sentence *dangao* 'cake' as a singular noun, in which case the sentence will be understood as 'a cake being eaten by all the puppies sits on a plate'. This will be called the 'singular bounded reading' of AE sentences. Alternatively the child may understand *dangao* 'cake' as a plural noun, in which case the sentence will be interpreted as 'the group of cakes being eaten by the group consisting of all the puppies sits on a plate'. This will be referred to as the 'plural bounded reading' of AE sentences. Clearly, in both readings the universal quantifier is bounded by the relative clause.

If the child correctly interprets the syntactic structure of (15a) but violates clauseboundedness, then the response will be as in Fig. 3(c), in which corresponding to each puppy, the cake being eaten by it sits on a different plate. This unbounded reading will be the crucial piece of evidence for violation of the locality condition on logical form.

We have hitherto assumed that the child correctly interprets the sentence as one containing a relative clause. An added complication will arise if the child reinterprets the structure of (15a). If the nominalizer or relative clause marker *de* is ignored, it is possible to reanalyse the sentence as a conjoined structure, as in (16) below.

(16) *meige xiaogou* dou [zai chi dangao], [fang zai *yige diezi* shang]
every puppy all ASP eat cake put at one plate on
"Every puppy is eating a cake, (and) is put on a plate"

The response for such an analysis is diagrammed in Fig. 3(d), in which each puppy is eating a different cake and sitting on a different plate. Data such as this will not be relevant to this discussion because even if the universal quantifier takes wide scope, it does not do so by crossing a clausal boundary.

I will now explain why the (b) sentences of (12-15), that is the EA sentences in which the existential quantifier lies in the relative clause and the universal quantifier in the main clause, will not be informative with respect to the aims of our investigation. The possible responses of the subject to (15b) are diagrammed in Fig. 4.

The main problem in interpreting sentences of the EA order is that the reading predicted to be impossible by the locality constraint is logically equivalent to another reading in which *yige xiaogou* 'a dog' is interpreted referentially, as a particular dog. Both readings give the interpretation as in Fig. 4. If this phrase is understood as an existential quantifier, the unbounded reading of this quantifier taking scope over the universal quantifier in the main clause can be represented as Fig. 4(a) or Fig. 4(b). The former represents a singular reading of the subject of the main clause, *dangao* 'cake', while the latter a plural reading of the subject. However, both readings are also compatible with a referential interpretation of the indefinite noun phrase *yige xiaogou* 'a dog'. The referential interpretation will not be relevant to our investigation, since the indefinite noun phrase in this case will not be understood as a quantifier phrase. Thus, the EA sentences do not give unequivocal evidence of violation of the clauseboundedness constraint.

Fig. 4(a) singular referential reading
/*unbounded reading

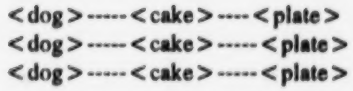

Fig. 4(b) wide scope reading of A

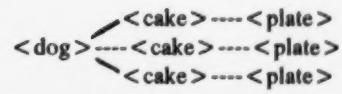

Fig. 4(c) plural referential reading
/*unbounded reading

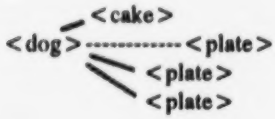

Fig. 4(d) conjoined reading

Fig. 4 Possible interpretations of a Type II test sentence with EA order:
[*yige xiaogou* zai chi] de dangao fang zai *meige diezi* shang
one puppy ASP eat NOM cake put at every plate on
"The cake [that some puppy is eating] is put on every plate"

The two remaining possible interpretations of (15b) are given in Fig. 4(b) and 4(d). The first represents the reading in which the universal quantifier in the main clause takes wide scope over the existential quantifier in the relative clause. Corresponding to every plate, there is a different cake being eaten by a different puppy. The second represents the reading in which the test sentence is reanalyzed as a conjoined structure, as in (17).

(17) *yige xiaogou* [zai chi dangao], [fang zai *meige diezi* shang]
one puppy ASP eat cake put at every plate on
"Some puppy is eating a cake (and) is put on every plate"

Either a referential reading or quantificational reading of *yige xiaogou* 'a puppy' will yield the situation in Fig. 4(d). This evidence again will not be shed light on observance or violation of clauseboundedness constraint.

In view of the above considerations, I will focus on the sentences with AE order in my presentation of the results and in my discussion.

5.4 Results on picture identification tasks

The results of the picture identification tasks on AE sentences are given in Tables 1 and 2. The responses on Type I sentences show that adults generally do not permit violation of the clauseboundedness constraint on any analysis. 83% of the adults gave a singular bounded reading; only one adult consistently gave an unbounded reading, while another wavered between a bounded reading on one test sentence, and an unbounded reading on another. The results on Type II sentences showed a slightly different picture, despite a similar tendency toward a bounded reading. 58% of the adults gave a singular bounded reading; 2 adults consistently gave an unbounded interpretation, while 3 others shifted between a bounded and an unbounded reading.

This discrepancy between the adult responses on the Type I and Type II sentences may be due to the possibility for reanalysis of Type II sentences as conjoined structures (cf. (16)), in which case the universal quantifier would not fall within a subordinate clause, and thus could take wide scope.

With regard to children's responses on Type I sentences, Table 1 shows that 75% of the four-year-olds chose the singular bounded reading. This figure dropped to 50% or slightly more for the five-, six-, and seven-year-olds, and climbed to 83% among the eight-year-olds. It should be observed at the same time that, with the exception of the seven-year-old group, there were extremely few consistent unbounded readings, the figure never exceeding 2 for any age group.

The picture looks somewhat different when we come to Type II sentences. As in the case of the adults, the children's responses on Type II sentences were more erratic. Only the four- and six-year-olds gave consistent bounded readings around 60% of the time. The figure for consistent singular bounded readings for the other age groups fluctuated between 15% and 33%. In contrast, between 33% and 62% of the five-, seven-, and eight-year-olds gave consistent unbounded readings, and between 25% and 33% of the child age groups varied between an unbounded reading and a bounded reading.

This more erratic pattern found in Type II sentences may be attributed to two factors. One is that Type II sentences could be reanalyzed as conjoined structures (cf. (16)). Secondly, once this reanalysis was carried out and a conjoined interpretation given, no picture was presented by the experimenter corresponding to the conjoined analysis. This may account for the relatively higher percentage of subjects in Table 2 rather than Table 1 who gave a bounded response on one test sentence and an unbounded response on another (see Column Four of the Table).

Table 1: Interpretation of AE sentences of the Type I form
[I _ V QNP_1] de N] V .. QNP_2 (Picture Identification)
A E

Example: [_ nazhe *meiba yusan*] de xiaohai zhan zai *yige dengzi* shang
carry every umbrella NOM child stand at one stool on
"The child [who is carrying every umbrella] is standing on a stool"

Age	singular bounded reading on both test sentences	unbounded reading on both test sentences	singular bounded/ unbounded reading on one test sentence
4 yr-old	9 (75%)	0	3 (25%)
5 yr-old	6 (50%)	2 (17%)	4 (33%)
6 yr-old	7 (58%)	0	5 (42%)
7 yr-old	7 (54%)	5 (38%)	1 (8%)
8 yr-old	10 (83%)	2 (17%)	0
Adult	10 (83%)	1 (8%)	1 (8%)

Table 2: Interpretation of AE sentences of the Type II form
[[QNP_1 V _] de N] V QNP_2 (Picture Identification)
A E

Example:[*meige ren* dou nazhe_] de yusan dingzhe *yiding maozi*
every person all carry NOM umbrella support one hat
"The umbrella [that everyone is carrying] is supporting a hat"

Age	singular bounded reading on both test sentences	unbounded reading on both test sentences	singular bounded/ unbounded reading on one test sentence
4 yr-old	8 (67%)	1 (8%)	3 (25%)
5 yr-old	2 (17%)	5 (42%)	5 (42%)
6 yr-old	7 (58%)	2 (17%)	3 (25%)
7 yr-old	2 (15%)	8 (62%)	3 (23%)
8 yr-old	4 (33%)	4 (33%)	4 (33%)
Adult	7 (58%)	2 (17%)	3 (25%)

5.5 Results on Act-out Tasks

The results on act-out tasks are more revealing, since the subject was not limited to a choice between two options. In the picture identification task, the subject had a 50% chance of hitting the right picture corresponding to the bounded or unbounded reading. The more open-ended nature of the act-out task would rule out this kind of random response. However, the act-out task had a different type of built-in bias. The fact that the subject was presented with three sets of objects, each with three members, may have favored an unbounded reading. We know from other experiments on quantification that children sometimes exhibit a tendency to match objects to produce a one-one correspondence (cf. Lee in press). In addition, if the child subjects were to rely heavily on pragmatic information, they might be reluctant to opt for readings for which some of the toys would be left undeployed.

Table 3: Interpretation of AE sentences of the Type I form
[[_ V QNP_1] de N] V .. QNP_2 (Act-out)
A E

Example: [_ nazhe *meige kuaizi*] de xiaohai zhan zai *yige dengzi* shang
carry every chopstick NOM child stand at one stool on
"The child [who is carrying every chopstick] is standing on a stool"

Age	singular bounded reading on both test sentences	unbounded reading on both test sentences	singular bounded/ unbounded reading on one test sentence	Special scope reading on one or both sentences
4 yr-old	1 (8%)	1 (8%)	0	10 (83%)
5 yr-old	0	6 (50%)	2 (17%)	4 (33%)
6 yr-old	4 (33%)	1 (8%)	2 (17%)	5 (42%)
7 yr-old	5 (39%)	3 (23%)	2 (15%)	3 (23%)
8 yr-old	9 (75%)	2 (17%)	0	1 (8%)
Adult	9 (75%)	0	0	3 (25%)

The results on act-out tasks are shown in Tables 3 and 4. In considering the adult responses on Type I sentences (see Table 3), we first note that there was absolutely no violation of the clauseboundedness condition. 75% of the adults consistently gave the singular bounded reading. The remaining adults gave special scope responses which (as we will see in Table 5) were all plural bounded readings. This means that 100% of the adults gave bounded readings on Type I sentences. Turning to Table 4, we see essentially the same picture: only 1 adult consistently gave an unbounded reading; 42% of the adults consistently responded with a singular bounded reading, while another 42% gave special scope responses that turned out to be (see Table 5) plural bounded readings. In other words, 84% of the adults gave bounded readings on Type II sentences.

Table 4: Interpretation of AE sentences of the Type II form
[[QNP_1 V _] de N] V QNP_2 (Act-out)
A E

Example: [*meige xiaogou* dou zai chi] de dangao fang zai *yige diezi* shang
every puppy all ASP eat NOM cake put at one plate on
"The cake [that every puppy is eating] is put on a plate"

Age	singular bounded reading on both test sentences	unbounded reading on both test sentences	singular bounded/ unbounded reading on one test sentence	Special scope reading on one or both sentences
4 yr-old	0	2 (17%)	0	10 (83%)
5 yr-old	0	8 (67%)	0	4 (33%)
6 yr-old	0	5 (42%)	0	7 (58%)
7 yr-old	0	6 (46%)	1 (8%)	6 (46%)
8 yr-old	0	3 (25%)	5 (42%)	4 (33%)
Adult	5 (42%)	1 (8%)	1 (8%)	5 (42%)

Turning to the child subjects, we observe from Table 3 a clear developmental trend in the percentage of singular bounded readings of Type I sentences. The figure started at 8% among the four-year-olds, but increased steadily to 39% among the seven-year-olds and 75% among the eight-year-olds. However, there were considerable violations of locality among the five-year-olds (50%) and seven-year-olds (23%).

The results on Type II sentences in Table 4 show even more consistent violations of clauseboundedness. It is striking to observe that none of the child subjects consistently gave singular bounded readings. In contrast, serious violations of locality (between 25% and 67% of the age group) can be seen in the responses of the five- through eight-year-olds.

Two factors may have been responsible for this high percentage of violation. One is, as I have mentioned earlier, the bias favoring matching of objects induced by the task and prop setting. Another factor may be the susceptibility of Type II sentences to reanalysis as conjoined structures, which would free these sentences from the constraints of locality.

The special scope responses are worthy of detailed attention, because herein lies important evidence for the clauseboundedness constraint. On

both Type I and Type II sentences, between around 30% and 83% of each age group showed special scope responses. To assess the significance of this pattern, we divided the special scope readings into three broad categories in Table 5: quantifier errors, plural bounded readings and conjoined readings.

Table 5: Classification of Special Scope readings on AE sentences.
Number of responses in different categories (Act-out only).

Age	AE sentences of Type I form					AE sentences of Type II form					% of total responses
	Quantifier errors			plural bounded reading	conjoined reading	Quantifier errors			plural bounded reading	conjoined reading	
	EE	AA	EA			EE	AA	EA			
4yr	7	3	3	0	0	7	1	4	1	2	53%
5yr	7	0	0	0	0	4	0	0	0	0	25%
6yr	6	0	0	0	0	2	1	0	0	6	32%
7yr	0	1	0	4	0	0	0	0	6	1	13%
8yr	0	0	0	3	0	0	0	0	5	0	9%
Adt	0	0	0	4	0	0	0	0	7	0	15%

A clear distribution of responses emerges from the table. For the four- to six-year-olds, the vast majority of the special scope responses were quantifier errors falling into one of three sub-types: either the young children reinterpreted the relationship between a universal quantifier phrase and an existential quantifier phrase as one between two existential quantifier phrases (EE), or as one between two universal quantifiers (AA), or they changed the ordering of the quantifier phrases from AE into EA. Fig. 5 illustrates the EE and AA quantifier errors corresponding to the AE sentence (15a).

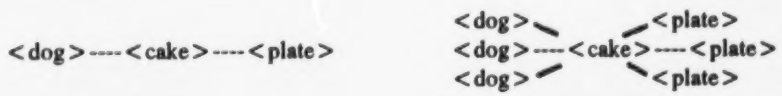

Fig. 5(a) Fig. 5(b)

Fig. 5 Children's Quantifier Errors in Act-out Tasks

On the other hand, for the seven- and eight-year-olds and the adult group, all but one of the responses were plural bounded readings, which were consistent with the locality condition on logical form.

The fact that the special scope readings for the younger age groups were primarily errors in registering the quantifiers or errors in quantifier ordering suggests that this category of responses should not be taken as a mark of violation of clauseboundedness. The absence of quantifier errors among the 7-and 8-year-olds indicates that they were better able to handle the complexity of the task. In such circumstances, almost all the special scope responses of older children were plural bounded readings, reflecting adherence to the locality principle.

6. Discussion

To summarize the results presented above, on both Type I and Type II sentences and across task types, the majority of adults gave singular bounded readings, while some gave plural bounded readings. The general picture reflects consistent observance of the locality condition on quantificational scope.

The performance of the children varied noticeably according to the sentence type. Type I sentences reflected a generally low percentage of consistent locality violations on both kinds of tasks (cf. the percentage of consistent unbounded readings in Table 1 and Table 3). In addition, on act-out tasks, a clear developmental pattern in consistent singular bounded readings could be discerned (cf. Table 3).

Type II sentences, however, showed a much greater level of consistent unbounded readings. Given the bias toward an unbounded response in act-out tasks, and the fact that Type II sentences are more prone to be reanalyzed as conjoined structures with the universal quantifier in the main clause, data on Type I sentences should provide us with a firmer basis for analysis of the child's competence. Once we confine ourselves to Type I sentences, we find that except for some of the five- and seven-year-olds, the clauseboundedness constraint was observed by children and adults alike.

Table 6: Number of subjects who were 75% or more correct on Type I or Type II Sentence structure and differentiated between AE and EA order on simple clauses, but violated clauseboundedness

Age	Number of subjects	Sentence Type in which consistent violation occurred in Picture Identification	Sentence Type in which consistent violation occurred in Act-out	75% correct on Type I Sentence	75% correct on Type II Sentence
7yr-old	2	Type II		yes	yes
	1	Type II	Type I, Type II	yes	yes
	1	Type I,Type II		yes	yes
	1	Type I,Type II	Type II	yes	yes
8yr-old	1	Type II		yes	yes
	1		Type II	yes	yes
	1	Type I,Type II		yes	no
	1		Type I	yes	no
Adult	2	Type II		(yes	yes)
	1	Type I	Type II	(yes	yes)

The next question becomes: do the consistent unbounded readings reflect a genuine violation of locality? To answer this question, one would need to consider the prerequisites that have to be satisfied before one could be assured of a genuine violation. Specifically, the individual subject should (a) show understanding of the sentence structure in which the violation occurred (Type I and Type II), (b) demonstrate that s/he could differentiate

the AE and EA quantifier orderings, with clear attention paid to quantifier ordering, and (c) produce consistent unbounded readings. If all these features are observed in an individual subject, then one would have to think hard about his/her locality violations.

The child subjects who satisfied these conditions all turned out to be seven- or eight-year-olds. In addition, 3 adult subjects belonged to this category. The profile of consistent violations of these subjects is given in Table 6 below. I relied on results of a separate study which tested the same subjects' comprehension of sentences containing relative clauses (see Lee to appear) as a guide to their understanding of Type I and Type II sentences. A 75% level of correct comprehension was arbitrarily chosen. I also used the results of other tests for information about the same subjects' interpretation of universal and existential quantifiers in simple clauses (see Lee (in press) for details of the rationale).

As revealed in Column Two of Table 6, 5 seven-year-olds, 4 eight-year-olds, and 3 adults responded with genuine consistent unbounded readings, mostly on Type II sentences, and to a much lesser extent on Type I sentences. If we further restrict ourselves to Type I sentences, the group who consistently violated locality would be reduced to 3 seven-year-olds, 2 eight-year-olds, and 1 adult.

Why should these subjects, who consistently showed sensitivity to quantifier ordering, and who presumably should not have difficulty with the processing of Type I and Type II sentences, go for unbounded readings? I would like to suggest that these violations might have been incurred by the increased complexity of sentences containing relative clauses when the referring expressions in the clauses were replaced by quantifier phrases. In the experiments testing comprehension of relative clause sentences, only referring expressions were used as the arguments of the clauses. Therefore, even if subjects experienced no difficulty on these sentences, they might have found it difficult to process Type I and Type II sentences which contained quantifier phrases. In other words, the possibility remains that these subjects may not have attended to the structural and constituent cues despite an ability to do so. In so doing, they would have eliminated the subordinate clause and reanalyzed the sentence as a simple clause, making seemingly unbounded readings legitimate.

7. Conclusion

In this paper, we explored the issue whether the clauseboundedness condition on quantification is obeyed by Mandarin-speaking children. We have presented experimental evidence on how 4- to 8-year-olds interpreted complex sentences in which a quantifier phrase is embedded in a relative clause, while another is located in the main clause. We observed that to be able to examine children's knowledge of locality, we must make sure that the subjects are assigning the correct representation to the test sentences, and that they are not interpreting the indefinite NP as a referring expression.

These considerations have led us to identify sentences in which the universal quantifier sits in the object position of the relative clause (Type I sentences) as a reliable ground for observing children's comprehension of the quantified sentences.

Subjects' performance on Type I sentences in the picture identification

task suggests that half or more of the subjects in the various age groups consistently gave a singular bounded reading, reflecting adherance to the locality condition (cf. Table 1, column Two). Their performance on similar sentences in the act-out task shows that approximately one-third of the 6- and 7-year-olds, and 75% of the 8-year-olds gave a consistent singular bounded reading (cf. Table 3, column Two). Closer inspection of the various types of responses of the children reveals that the 4- to 6-year-olds experienced difficulty in coping with the complex test sentences. Many of the errors stemmed from either interpreting both quantifiers as existential quantifiers or universal quantifiers, or involved a reversal of the ordering of the quantifiers (cf. Table 5, columns Two to Four). Besides the singular bounded reading and the singular unbounded reading, a major type of response of the 7- and 8-year-olds was a plural bounded reading, which in fact conforms to the locality constraint. The data together point to a clear sensitivity to the clauseboundedness constraint on quantification among the 7- and 8-year-olds. Our analysis of the subjects' understanding of relative clause structure (given in Table 6) indicates that the somewhat irregular pattern of consistent bounded readings among the 4-, 5-, and 6- year-olds may be due to the complexity of the experimental task rather than to violation of locality principles. Future research with an improved experimental methodology may shed further light on this issue.

Our analysis thus far is by and large compatible with the assumption that clauseboundedness of quantification is an innate linguistic property, which should manifest itself in the linguistic behavior of individuals, so long as other prerequisites are satisfied and performance factors are abstracted away. This property is linguistic in character, since it makes reference to clausal boundaries in syntactic structure. It should be attributed to an innate mechanism, in view of the abstractness of such knowledge and the seeming impossibility of acquiring such knowledge on the basis of positive evidence. The overall empirical results of this study also indicate the presence of such knowledge in 7- and 8-year-olds, and perhaps in the younger age groups as well.

Disagreement will remain as to whether researchers would agree that this innate property should be counted as part of the individual's innate knowledge (cf. Quine 1972, Nagel 1974, D'Agostino 1986). Empirical research on the ontogenesis of grammar in the past three decades has produced a rich body of findings that bear on these issues. These results surely cast doubt on the sceptical remark of Quine (1972) that "Timely reflection on method and evidence should tend to stifle much of the talk of linguistic universals" (in Harman 1974:109).

References

D'Agnostino (1986) *Chomsky's System of Ideas*. Oxford: Clarendon.

Allwood, J. (1982) "The Complex NP Constraint in Swedish", in Engdhal, E. and E. Ejerhed (1982) eds.

Chien, Y.C. and K. Wexler (1989) "Children's knowledge of relativescope in Chinese" *Papers and Reports on Child Language Development* 28:72-80.

Chomsky, N. (1976) "Conditions on Rules of Grammar" *Linguistic Analysis* 2.4, also in N. Chomsky (1977) *Essays on Form and Interpretation*, Amsterdam: North Holland.
Chomsky, N. (1980) *Rules and Representations*. New York: Columbia University Press
Chomsky, N. (1981) *Lecture on Government and Binding*. Dordrecht: Foris.
Chomsky, N. (1986) *Knowledge of Language: its nature, origin, and use*. New York: Praeger.
Chomsky, N. (1988) *Language and Problems of Knowledge: the Managua Lectures*. Cambridge: MIT Press.
Dowty, D., R. Wall, and S. Peters (1981) *Introduction to Montague Semantics*. Dordrecht: Reidel
Engdhal, E. and E. Ejerhed (1982) eds. *Readings on Unbounded Dependencies in Scandinavian Languages*. Stockholm: Almqvist & Wiksell.
Farkas, D. (1981) "Quantifier Scope and Syntactic Islands", in R.Hendrick, C. Masek, and M. Miller (eds) *Papers from the 17th Chicago Linguistic Society Meeting*, pp. 59-66.
Greenfield, P. (1978) "Structural Parallels between Language and Action in development" in A. Lock (ed) *Action, Gesture, Symbol*. New York: Academic Press.
Harman, G. (1974) *On Noam Chomsky: Critical Essays*. Amherst: University of Massachusetts Press.
Hornstein, N. (1984) *Logic as Grammar*. Cambridge: MIT Press.
Hyams, N. (1986) *Language Acquisition and the Theory of Parameters*. Dordrecht: Reidel.
Katz, J. (1981) *Language and other Abstract Objects*. Totowa, NJ: Rowman & Littlefield.
Lee, T. (1986) "Acquisition of Quantificational Scope in Mandarin Chinese" *Paper and Reports in Child Language Development* 25: 57-64.
Lee, T. (to appear) "The Inadequacy of Processing Heuristics: evidence from Relative Clause Acquisition in Mandarin Chinese" in Linguistic Society of Hong Kong (ed) *Research on Chinese Linguistics in Hong Kong*.
Lee, T. (in press) "Linearity as a scope principle for Chinese: the evidence from first language acquisition", in D. Napoli and J. Kegl (eds.) *Bridges between psychology and linguistics*. Hillsdale, NJ:Lawrence Erlbaum.
Manzini, R. and K. Wexler (1987) "Parameters, Binding Theory Learnability", *Linguistic Inquiry* 18.3: 413-444.
May, R. (1977) *The Grammar of Quantification*. MIT doctoral dissertation.
May, R. (1986) *Logical Form*. Cambridge: MIT Press.
Nagel, T. (1974) "Linguistics and Epistemology" in Harman 1974.
Otsu, Y. (1981) *Universal Grammar and Syntactic Development in Children: toward a theory of Syntactic Development*. MIT doctoral dissertation.
Piaget, J. and B. Inhelder (1969) *The Psychology of the Child*. New York: Basic Books.

Piatelli-Palmarini, M. (ed.) 1980. *Language and Learning: the debate between Jean Piaget and Noam Chomsky*. Cambridge: Harvard University Press.
Quine, W. (1974) *The Roots of Reference*. La Salle: Open Court.
Rodman, R. (1976) "Scope phenomena, 'movement transformations', and relative clauses", in B.Partee (ed) *Montague Grammar*. New York:Academic Press.
Ross, J. (1967) *Constraints on Variables in Syntax*. MIT doctoral dissertation (excerpts in Harman 1974).
Stowell, T. (1981) *Origins of Phrase Structure*. MIT doctoral dissertation.
Xu, L. J. and T. Lee (1989) "Scope ambiguity and disambiguity in Chinese" *Papers from the 25th Chicago Linguistic Society Meeting*, 451-466.

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Do learning environments make a difference? A study on the acquisition of the English Interrogatives by three types of Cantonese classroom learners

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Abstract

This paper reports on a study which attempts to investigate the acquisition orders of the English Interrogatives established in three groups of Cantonese classroom learners. A goal of the study is to examine the effect of formal instruction on second language acquisition, to discover whether different intensity of classroom instruction has an effect on the acquisition order.

Within the framework of the experiment, an attempt was made to separate interlanguage (IL) knowledge from production, with an underlying assumption that classroom learners might know more than they could produce.

The results of this study reveal that despite different intensity of formal instruction and extent of informal exposure, the IL development of the three groups of classroom learners largely conformed to the universal sequence of development as far as production is concerned. Moreover, differences which may be attributable to IL variability between knowledge and production were also found. Rules relating to SV-inversion established from the learner's IL knowledge did not coincide with those established from production.

Introduction

The study of classroom second language development has attracted a great deal of attention recently partly because of pedagogical motivation; and partly because those interested in input studies have begun to ponder whether explicit form-focused teaching would create an effect on second language development. In many second or foreign learning situations, learners are generally exposed to the target language structures sequenced and highlighted by a teacher who in many cases is a non-native speaker of the target language. Therefore, examining the effect of this type of linguistic input on second language development is deemed necessary.

Empirically, in second language acquisition research, there has been a debate on what constitutes useful data with which SL learning processes and strategies can be deduced. Early IL studies which aimed at tracing developmental sequences among second language learners tended to base their analysis on oral, performance data. Selinker (1972) maintains that the only data useful for IL analysis are observable data (i.e. performance reflects one's competence); and he explicitly rejects the use of grammaticality judgments as a reliable source of information about the learner's transitional competence.

On the other hand, researchers adopting the generative paradigm, namely UG, in their explanation of second language development usually attempt to elicit SL learners' grammaticality judgments so as to characterize their IL "competence".[1](White 1986, Liceras 1985).

While acknowledging the information of these two types of data may yield, some other researchers take an interest in examining the relationship between IL competence and IL performance. These research studies, though not many, can roughly be grouped under the domain of IL knowledge and use, or in general terms, IL variability from a cognitive processing dimension

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[1]Researchers in this field have now and again indicated that their prime interest lies in investigating the competence of the SL learner, not his performance.

(Bialystok 1982, Sorace 1985, Sharwood Smith and Kellerman 1985). This paper is concerned with the third position mentioned above, with an objective to examine the effect of different learning environments on the SL development of three groups of Cantonese learners of English. It is argued here that striking an empirical distinction between 'competence' and 'performance' in examining classroom SL development is deemed necessary in order to achieve a better understanding of the learning processes characteristic of a formal classroom learning context.

2.1 Two Dimensions of Classroom Second Language Research

2.1.1 The 'Natural Order' of Second Language Development

Studies on naturalistic second language acquisition generally conclude with the finding that SL learners who acquire language in this type of environment follow a universal order of development. In fact, there has been a constant debate on how useful pedagogical input can be in second language acquisition. The heart of the argument lies in whether SL learners make use of pedagogical input to formulate a corresponding set of hypotheses about the TL; or whether in fact, hypothesis formation and testing is an internally driven process. Advocates of the latter approach are Dulay and Burt (1973) and Krashen (1982). Felix (1981) and Felix and Hahn (1985) also suggest that at least some of the processes operating in naturalistic L2 and L1 acquisition are also found in tutored L2 acquisition such as 'decomposition' introduced by Wode (1981) to refer to acquiring a free morpheme not in a wholesale fashion but by gradually taking in the individual semantic features entailed. To these researchers, it is the internally driven language learning processes that are responsible for several striking similarities between L1 and L2 naturalistic acquisition. Seen in this light, the underlying language acquisition processes are 'immune' to external situational variables and classroom input should be as 'natural' as possible (Krashen and Terrell 1983); otherwise 'teaching efforts are doomed to failure when they are in conflict with naturalistic language acquisition principles' (Felix and Hahn 1985).

Despite these pronouncements on the universality of language acquisition, researchers have recently begun to

argue for the utility of pedagogical input, which in a second language classroom manifests itself as metalinguistic information provided by the teacher. Ringbom (1980) suggests that pedagogical input may relieve the learner of the burden of hypothesis formation about the TL structures which are provided 'ready-made' in the classroom. Faerch (1986) argues that pedagogical rules may be used to support foreign language learning despite being simplified 'rules of thumb' provided by the teacher. Recently, some researchers like White (1987) or Schachter (1986) go further to suggest that pedagogical input may be useful for certain aspects of grammar which cannot be 'comprehended' with the help of contextual meaning, or for which direct positive evidence is not available in the input data. An experimental conducted by White reveals that a temporary positve effect is shown in subjects receiving both positive and negative evidence in the classroom learning situation (White 1991). However, it is not at all certain at this present state of research whether providing direct or indirect negative evidence in classroom situations will facilitate second language development.

As far as the present study is conce ned, two possible effects of pedagogical input on SLA are being hypothesized:

(a) Its effects may be seen in the order of development of an IL feature, in this case, the development of the English interrogatives.

(c) It may lead to qualitative differences in IL knowledge in terms of the development of automaticity and analyticity of IL development, as defined by Bialystok (1981).

2.1.2 Cognitive Basis of Interlanguage Development

Recently, SL researchers working within a cognitivist paradigm have tended to adopt either the information processing model or the knowledge-control model. Proponents of the information processing model, who regard SL learning as the acquisition of language skills, claim that such development involves a gradual change from controlled to automatic processing via

practice (McLaughlin 1987).

In the knowledge-control model, IL development may be described as (i) the development of IL mental representations which may, in face of a perceived mismatch between the learner's IL grammar and target language grammar, undergo a reorganization of their internal structure; and (ii) the development of a set of SL procedures responsible for the creative activation and retrieval of IL knowledge in production and comprehension (Bialystok 1981, Bialystok and Sharwood Smith 1985, Faerch 1986, Sharwood Smith 1986). In other words, IL production or comprehension is the outcome of an interaction between probably a combination of knowledge sources available to the learner and a set of psycholinguistic language processing procedures.

The present study is based on an early conceptualisation of this framework found in Bialystok and Ryan (1983) in which SL development may be characterized as progress along the **Analysed Knowledge** and **Automatic Access** continua[2] (see Figure 1). Analysed knowledge refers to the level of structuring of the mental representations of knowledge. According to

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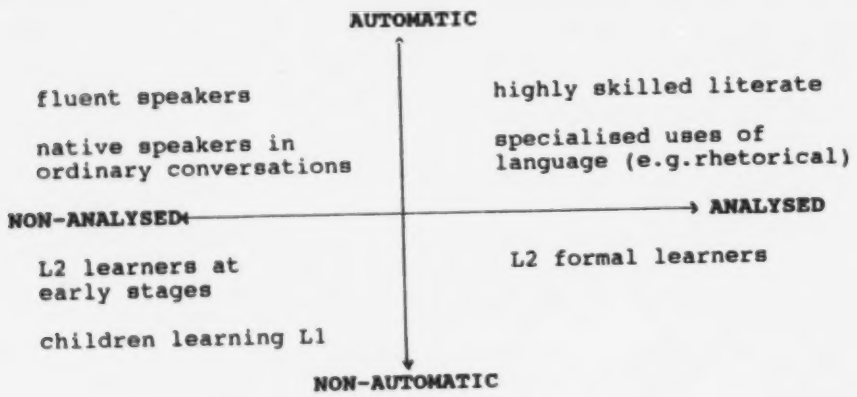
[2]Bialystok has changed her views on SL knowledge development quite substantially over the years. The **implicit-explicit** knowledge distinction which was developed earlier to account for the transferability of knowledge sources was later replaced by the more sophisticated **analysis-control** cognitive distinction. In the interim, Bialystok and Sharwood Smith (1985) seem to have incorporated both "knowing-that" (grammatical competence) and "knowing-how" (pragmatic competence) in the knowledge dimension while leaving the psycholinguistic procedures to the control dimension. In her recent reply to Hulstijn (1989), Bialystok defines the analysis-control distinction as cognitive dimensions each reflecting the learner's knowledge and skill. The kind of knowledge in the analysis factor is equivalent to the learner's mental representation of language, while the knowledge involved in the control factor is knowledge about the procedures of selection and coordination language information.

Bialystok, increasing control over the structure of knowledge along this analysed dimension implies that the learner is increasingly aware of and in control of its internal structural properties; and is able to apply the knowledge in new contexts of use. The second dimension, automatic access, as the name implies, refers to the level of efficiency or fluency with which knowledge may be accessed by the learner, irrespective of its degree of analysis. The following figure is taken from Bialystok (1981) for illustration.

Figure 1: Two dimension of language proficiency



Combining these two dimensions, SL development is viewed as progressing from the nonanalysed or the nonautomatic to the analysed or automatic end of the continuum. Development along these two continua is said to be independent, for example, knowledge that is analysed need not also be automatic.

In essence, both the information processing model and the knowledge-control model adopt a language processing approach towards the description of SL development. As McLaughlin (1987) himself claims, his model is concerned with the development of a complex language skill that involves cognitively the transfer and restructuring of information during the learning process, as SL development is measured principally by the efficiency with which this process is activated in

language performance. Recently, Hulstijn (1989) has further elaborated the information processing model by way of the cognitive psychological framework described by Anderson (1982). In this framework, the acquisition of language skills is considered as, apart from a gradual progression from controlled to automatic processing, a change in the form of knowledge from declarative to procedural representations.[3] According to Hulstijn (op.cit), applying Anderson's framework of the acquisition of cognitive skills to that of language learning, one can view "first and second language acquisition as the establishment of procedural knowledge (routine procedures) through the compilation of declarative language knowledge, and the gradual tuning and restructuring of procedural knowledge."

Seen in this light, what distinguishes the information processing model from the knowledge-control model is that the latter strikes a distinction, in terms of real time language processing, between the learner's mental representations and the cognitive procedures for accessing them. In the information processing model as discussed, this distinction is not maintained. It seems that the procedural knowledge as described encompasses both knowledge of language (in its procedural mode) as well as knowledge of routines and procedures (see footnote 3). What is at issue here is whether procedural knowledge includes domain specific linguistic knowledge as its content and Hulstijn appears to be arguing for its existence.

On the other hand, we find that in recent SL research, researchers prefer to restrict procedural knowledge to knowledge about how linguistic knowledge is retrieved and processed, while maintaining that declarative knowledge represents one's propositional, tacit knowledge of language (underlying linguistic

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[3]Anderson argues that during the process of **proceduralization**, the essential domain specific declarative information will be built into the new procedural knowledge (p.383). However, he claims that this does not imply a necessary loss of declarative representation of the knowledge, though it may cease to be used or simply be forgotten.

competence) which may be subject to manipulation in certain conditions (Faerch 1986). Whether or not procedural knowledge is knowledge of how linguistic knowledge is processed remains a matter of conceptual debate; nevertheless, one can see that maintaining such a distinction between the development of underlying knowledge and retrieval processes in language production and comprehension presents some advantages in SLA research.

2.1.3 Implications for classroom IL development

A consequence of maintaining such an empirical distinction in IL research is that the terms "acquisition" or "natural route of development" may be viewed in a different light. It has opened up the possibility of distinguishing the "competence orders" from the "control order". As Sharwood Smith and Kellerman (1986) states, a language structure may be acquired "in principle" (in the competence sense) but may suffer a long delay "in practice" (overt behaviour) due to some inherent processing problem. In other words, performance may not reflect competence in any sufficiently transparent way as was commonly perceived by many researchers. Methodologically, this distinction enables the researcher to discover whether a L2 form belongs to the learner's interlanguage competence, or whether that form is available to the learner but is not used in production, or whether that form is in conflict with other competing forms in the IL systems. This approach, then, may account for IL variability in the learner's performance and provide invaluable information on the process of IL development.

Within the conceptual framework of Bialystok in which the qualitative aspects of SL development may be characterised in terms of the degree of analysis and cognitive control, it is argued in this paper that the discrepancy between IL knowledge and production varies between different types of learners. In more specific terms, learners from different types of classroom learning contexts may demonstrate this discrepancy in different task situations. Following Ellis's (1985) arguments, different learning environments may lead to differences in the set of discourse domains engaged by the learner in such a way that they shape the types of

psycholinguistic processes and the quality of his SL competence.

To put it in the perspective of Bialystok's model, certain types of classroom learners may have relatively more analysed mental representations of the L2 system without being able, particularly in the initial stages of development, to apply them in production, especially in spontaneous production. In other words, it is possible that the development of L2 processing routines for some types of classroom learners may lag behind that of the IL knowledge. If this is the case, controlling for mechanisms necessary for production, or adopting production tasks which do not require automatized retrieval procedures, classroom learners would be able to demonstrate their knowledge more adequately.

A methodological consequence arising from this issue is how one can probe into the learner's underlying competence. The solution seems to lie in the adoption of grammaticality judgments. In fact, Corder (1981) suggests that a learner also has 'intuitions' about the grammaticality of his language which are potentially investigatable. Kohn (1986) argues that grammaticality judgments in the form of recognition tasks may serve this purpose, though indirectly. The argument goes like this: a sentence which is judged to be grammatical is said to be in congruence with the learner's IL competence (Arthur 1980, Gass 1983) and changes in the learner's grammaticality judgments may reflect the evolution of his developing grammar.[4] Sorace (1989) claims that 'if extralinguistic variables are appropriately controlled, interlanguage judgments actually reflect interlanguage knowledge'.

3.1 Previous Research on the Acquisition of English Interrogatives

There are several studies attempting to investigate the developmental sequence of the English interrogatives

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[4]Both researchers have indicated their concern over the techniques for eliciting learner's judgments of grammaticality and Chaudron (1983) provides an excellent discussion.

by naturalistic second language learners (Ravem 1978; Wode 1978; Huang and Hatch 1978; Cancino et. al. 1975; Butterworth and Hatch 1974; Adams 1978; Zobl 1982). From these studies, it appears that despite certain differences, L2 learners from a variety of different L1 backgrounds who acquire this structure in a naturalistic setting do progress in a similar though not identical fashion to L1 learners. The 'universal sequence of development' thus claimed may be described as follows:-

(1) Intonation and uninverted yes-no questions are first utilized for questioning purposes. Wh-questions first appear uninverted.

(2) Subject-Verb Inversion appears first in copular and modal sentences of both yes-no and wh-questions.

(3) Do-insertion in main verb sentences; it may or may not be inverted.

(4) Embedded questions begin to occur first with inversion.

Apart from Huang and Hatch (1978), there is another study in which a Chinese learner is involved. This study examines the simultaneous acquisition of the interrogatives in both English and Chinese. Kwan (1986) conducted a longitudinal observation of a Cantonese pre-school child who had just begun to acquire English in Singapore, a multilingual setting in which English served as the lingua franca. Certain parallel developments were found between this study and in L1 or L2 acquisition studies of the English interrogatives in a naturalistic setting. However, Kwan's study also presents an interesting case of 'cross-linguistic influence' within this simultaneous acquisition process. Unpreposed wh-words, which are rarely found in L1 and L2 acquisition studies, constitute the initial stage of the developmental sequence of wh-questions in English. Errors such as *'*You're going where?*' which reflect the corresponding declarative word order in English are in fact possible questions in Cantonese. The subsequent preposing of wh-words in English is later over-extended to Cantonese. During that time, her subject produced preposed wh-words

in Cantonese questions, yielding ungrammatical questions like

"mat yeh lei seung maaih?"
what you want buy
(What do you want to buy?)

Studies that concern classroom second language language acquisition are not many. Ellis (1984) investigated two L2 learners who received instruction in a full-time withdrawal situation (i.e. without any exposure to native speaking children). He examined the acquisition of negation, interrogation, and a number of verb phrase morphemes. All these structures were formally taught at one time or another during the nine months. He collected data from spontaneous communicative utterances produced by the learners in the classroom, which displayed a pattern of development more or less similar to that observed in naturalistic SLA. However, he found that some transitional patterns like uninverted YES-NO questions were prolonged and some other structures were slow to emerge (e.g. past tense forms). Ellis ascribes these results to the nature of the classroom discourse to which the learners were exposed.

In the Passau project, Felix (1981) observed the developmental sequence of negation, interrogation, sentence types, and pronouns for 34 German learners of English in an EFL environment. Parallel developments were found with these learners when compared with those who acquired the TL in a naturalistic setting. What he reports as striking was the use of uninverted intonation questions by the learners when these types of 'samples' were neither found in classroom instruction nor in the teacher's questions. At the same time, the learners did not resort to their German L1 which requires inversion in the main clause. Based on these results, Felix suggests that both naturalistic and instructed learners are adopting similar natural processing strategies, irrespective of their learning context.

The last study to be reviewed in this section involves a group of Chinese classroom learners of English (Chen 1986). Only a rapid written translation task was used in the experiment and the results suggest that the development of yes-no questions precede wh-questions,

which in turn precede alternate questions. Moreover, the development of inversion was found to be related to the development of the auxiliaries in the sense that confusion between DO-BE as a question operator appeared to be a more advanced error than inversion.

To conclude, results from the two classroom studies seem to suggest that the natural acquisition processes are not in any principled way suppressed by the input, however contrived. In fact, one common characteristic shared by these two studies is that the analysis was based on spontaneous speech as in the case of Ellis' study, and in the other study, from oral exercises recorded during the lessons. These studies made no provision for probing into the learner's knowledge of the target structure which might exceed that shown in his performance.

3.2 Cross-linguistic comparison between Chinese and English

In general, both English and Chinese match in their basic word order, in that both follow the SVO order in declarative sentences. Despite this similarity, Li and Thompson (1976) argue that, from a typological point of view, these two languages reflect two diversely different propensities for marking functions with word order. According to Thompson (1978), some languages like Chinese tend to utilize predicate-argument order primarily for pragmatic purposes, as in theme-rheme, given-new information or the topic-comment sentence organization. On the other hand, some languages like English essentially make use of word order for grammatical purposes such as signalling questions and exclamations. Based on this analysis, Rutherford (1987) comments that the form-meaning relationships are more indirect in English than in Chinese. However, it does not imply that these typological properties are in complementary distribution; rather, languages may accommodate both properties but show a preference for either one of them.

As far as the formation of questions is concerned, syntactically, English exploits word order to mark questions while Chinese does not. In English, wh-movement is involved in which the wh-constituent is

consistently preposed in questions. Subject-verb inversion is required in simple questions but not required in embedded questions. In fact, SV-inversion which changes SVO to VSO order is typologically less common than Wh-preposing. In particular, inversion in Yes-No questions, according to Ultan (1978), occurs in only seven out of thirty eight languages in his survey. In other words, inverted Yes-No questions are typologically more marked than uninverted Yes-No questions. Recently, Eckman et.al. (1989) claim that implicational relationships may be established in that SV-inversion in yes-no questions implies the same pattern in wh-questions which in turn implies wh-preposing.

As seen from the examples below, Chinese follows a declarative word order in both statements and questions and makes use of the existing grammatical constituent in the sentence like the adjectives, verbs, adverbs to form an interrogative constituent. Since this process does not involve a change of word order, functionally, the topic-comment organization may be maintained (examples (a) to (d) below). Unlike English questions, Chinese questions do not require SV-inversion. In Wh-questions, the Wh-constituent always remains in situ in the declarative sentence. And yes-no questions may be expressed by means of a sentence final particle or by disjunctive A-not-A constructions. Readers may refer to Tang (1990) for a specific grammatical description of the Chinese interrogative system.

Questions in Chinese

(a) wh-questions:

"beih dak taam bingo?"
Peter visit who
(Who does Peter visit?)

(b) Yes-no questions (Particle questions):

"beih dak cheung go ga?"
Peter sing Q-particle
(Does Peter sing?)

(c) Yes-no questions (Disjunctive questions):

"beih dak cheung m cheung go?"
Peter sing not sing
(Does Peter sing?)

(d) Embedded yes-no questions:

"ma leih mahn beih dak cheung m cheung go?"
Mary asks Peter sing not sing
(Mary asks Peter if he sings)

4.0 The Present Study

4.1 Aims and Hypotheses of the Study

The present study involves three groups of classroom learners who are subject to different degrees of intensity of formal classroom instruction and of the opportunity for informal exposure to the target language. An overall aim of the present study is to see whether such differences have an effect on the IL development of classroom learners with respect to (a) their acquisition orders of the English interrogatives, and (b) the relationship between the development of IL knowledge and retrieval of knowledge in production. The hypotheses can be divided into two groups. The first group concerns the acquisition order of the rules of the English interrogatives while the second group is related to variability between IL knowledge and production.

(a) Acquisition Orders

The null and alternative hypotheses thus tested are the following:

H_0: There are no significant differences in the order of acquisition of the rules of the English interrogatives between the three groups of subjects.

H_1: There are differences in the order of acquisiiton of the rules of the English interrogatives between the three groups of subjects.

(b) Variability between IL Knowledge and Production

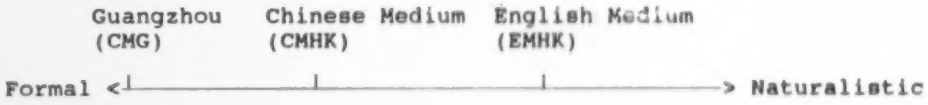
H_0: There are no differences in the performance of each group of subjects on the rules of the English interrogatives between tasks.

H_2: There are differences in the performance of each group of subjects on the rules of the English interrogatives between tasks and the order of difficulty of these tasks are may also be different.

4.2 Subjects

The three groups of subjects were typically from three different types of learning environment, two from Hong Kong (referred to as EMHK and CMHK) and one from Guangzhou (referred to as CMG). Schematically, they can be plotted on an formal/ naturalistic learning continuum.

Figure 2. Locating the learners on formal-naturalistic continuum



From each learning context, 45 subjects were randomly selected to be divided into three levels of proficiency according to their year of schooling (i.e. primary 6, secondary 2 and secondary 4).

The CMG subjects were reported to receive a traditional language teaching methodology which was basically grammar explanation supplemented by translation exercises and pattern drills which were sometimes done orally during the lessons. None of the subjects reported any informal exposure to English outside the school environment.

What differentiates the Hong Kong subjects from the Quangzhou subjects is that English is easily accessible within the wider Hong Kong context, and the mode of instruction in the Hong Kong context is also found to to different. While grammar-translation is heavily emphasized in the Guangzhou context, teachers in Hong

Kong seldom use this method but adopt a more eclectic approach which involves training in both language forms and their communicative values.

However, as reported by the CMHK subjects, the bulk of their exposure to English was derived from English lessons, as all other subjects as well as other school activities are conducted in the subjects' first language. Moreover, few claimed to be keen on investing their time in learning the English culture through films, TV shows ..etc which usually have Chinese subtitles.

The EMHK subjects, on the other hand, enjoyed a better facility in learning the target language in the sense that almost all content courses as well as extra-curricular activities were conducted in English. Some subjects were reported to have developed an interest and a regular habit of reading English novels and newspapers, and watching English films and TV programmes. However, they would seldom converse in English among themselves, except for class discussions and oral extra-curricular activities.

Although the three groups of subjects were sharing the same L1 background and were all classroom learners of a certain type, taught by a non-native speaker of the target language, they were differentiated by (i) their access to the target language in the wider community as well as the medium of instruction they received, which determines the extent of informal exposure available to them; and (ii) the characteristic mode of instruction and learning which they had undergone.

4.3 Elicitation tasks

The subjects were required to complete the following elicitation tasks: an oral task (OP), written dialogue completion (DC), timed grammaticality judgments (GJ), untimed error correction (CRC), and grammatical explanation (CRE). They were administered in the following sequence:

OP---> DC ---> GJ ---> CRC & CRE

The OP task required the subjects to construct a dialogue with a partner (usually the researcher himself)

with the help of cue cards. The DC task involved the filling in of an appropriate question in some short dialogues. As for the GJ task, the subjects were required to indicate the degree of grammaticality of a given stimulus on a 5-point grammaticality scale. They also had to indicate the certainty of their judgments on a 2-point certainty scale. In the error correction task, similar though not identical sentences were given; the subjects were asked to indicate whether these were grammatical without under time pressure. If a sentence was judged to be ungrammatical, subjects would have to locate the error, correct it and provide a possible explanation.

In general, the correction tasks as well as the grammaticality judgments were designed to examine the subjects' development of IL knowledge of the form. The correction tasks were designed to examine the subject's development of metalinguistic knowledge and the grammaticality judgment task for tapping the learner's intuitions which are taken to be indirect reflections of his underlying competence. The OP and the DC tasks were used to check if these subjects can produce appropriate questions in meaningful contexts. Built into these two groups of tests was the time factor, as the subjects were required to perform under both timed and untimed conditions.

4.4 Results and Discussion

This study attempts to investigate the development of the English interrogatives, namely yes-no questions, wh-questions and embedded yes-no questions as well as the related rules of question formation. In this paper, I will only concentrate on the development of inversion/non-inversion as well as the embedding process, while ignoring for the time being the development of the types of question, and the Q-operator.

The analysis was carried out with two statistical packages: For establishing the acquisition orders of the rules of the English Interrogatives by the three groups

of subjects, the Rasch analysis[5] instead of Guttman's implicational scaling was used. SPSSx procedures like ANOVA, MANOVA and Scheffe test were used to compare the subjects' development with respect to their performance on the elicitation tasks and the rules of the English Interrogatives.

4.4.1 The Acquisition Order of the rules of the English Interrogatives

Appendix 1a shows the acquisition orders established by the three groups of subjects. The accompanying sample statistics which can be found in Appendix 1b also suggest high reliability for most of the tests consistently reached a value of 0.9. The only test which has a slightly lower reliability index was the grammaticality judgment test where the value was around 0.7. During the analysis, the tasks were kept separate since it would allow the subjects' performance to be compared in different ways.

Generally speaking, all three groups of subjects were largely shown to follow a similar order of development with respect to the development of inversion rule in English questions, namely that inversion in yes-

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[5]The problems with Guttman's scaling have been documented in SLA research studies (see Hatch and Farhady 1982:182), and criticisms are usually levied on the adoption of an artificial cutoff point. The RASCH analysis provides an alternative because the cutoff point is no longer needed as the relationship between the difficulty of the grammatical categories and the ability of the subjects is described at a probabilistic level. In other words, by placing all the grammatical categories on a scale of difficulty, usually ranged between +5 and -5, it enables us to claim that if a learner has shown himself to have acquired a grammatical feature placed at a point on the scale, it implies that he has already acquired those features below it. In short, while allowing us to get round the problem of selecting an artificial cutoff point to determine whether a structure is acquired or not, the Rasch analysis is capable of capturing the learner's development on an implicational basis.

no questions were consistently found to develop earlier than that in wh-questions while non-inversion in embedded yes-no questions was found to cause the most difficulty. However, this interpretation is restricted to the production tasks only where errors of uninverted questions were evident in the data of all three groups of students and were more frequent than unpreposed wh-questions. Nevertheless, wh-preposing and inversion in yes-no questions were consistently occupying the bottom part of the difficulty scale for all three groups of subjects while the rules for embedded questions are usually at the top. These findings provide some evidence that as far as production is concerned, all three groups of classroom learners were following a similar order of development which is also pertinent to the 'natural sequence' established in previous SL 'performance' studies concerning naturalistic learners.

The results here suggest that environmental differences have no effect on the 'control' order of development, at least at the initial stage of their development as ample evidence of uninverted questions were found in the corpus for all three types of questions. This suggests either that the learner might at the outset assume that English questions are uninverted, possibly as a result of their being influenced by their knowledge of L1 or the universal processes of language acquisition, or that they have not yet developed the relevant procedural routines to retrieve this newly established knowledge of inversion in English questions.

For a preliminary answer to the question of whether these learners have already acquired the knowledge in principle while unable to retrieve it in practice, one may refer to the relative position of some of the rules plotted on the scales between the tasks. In the correction task (CRC), most of the rules were found at a lower position on the scale when compared with either the oral production (OP) and the written dialogue completion (DC) tasks, suggesting that these learners did have some metalinguistic knowledge of the interrogative system but were not ready to retrieve it in meaningful production.

A further examination of the scales reveals two facts. First, except for two cases, whether wh-preposing

precedes inversion in yes-no questions depends on the availability of time. In general, wh-preposing precedes inversion in yes-no questions whenever the task is untimed (e.g. DC or CR(E)) and follows it if the tasks is timed (OP or GJ). This phenomenon to some extent reveals the interaction between the learner's IL knowledge, be it analysed or intuitional, and L1 influence. Even though both rules are different from the L1 system of the learner, given sufficient time, it is the one that has attained greater analyticity that wins and overrides even the learner's L1 system.

Another discrepancy may be found in relation to the relative position of the connective in embedded yes-no questions between meaningful production and understanding of the form as shown in the CR tasks. In general, the most difficult rule in the OP and the DC tasks is the development of the connective 'if' or 'whether' while it is uninverted embedded questions in the CR tasks. This may be explained by the fact that during production, beginner learners especially had the tendency to produce uninverted embedded yes-no questions such as "I'd like to know you are a student" before this structure was eventually replaced by inverted embedded yes-no questions. On the other hand, in the CR task where learners were encouraged to retrieve metalinguistic knowledge in their performance, it is found that their knowledge of inversion in question formation is overextended to embedded questions.

Moreover, the acquisition orders established from the subject's grammaticality judgments reveal some discrepancies either between the three groups of subjects or when compared with the adult competence as established by a group of native speakers. With respect to the "competence order" established from the subjects' grammaticality judgments, two scenarios emerged from the analysis, (a) this order is different from that established from the subjects' metalinguistic knowledge; and (b) the CMHK and CMG subjects were following a similar order of development except that the CMHK subjects were shown to have great difficulty in acquiring uninverted embedded yes-no questions, as suggested by the higher position occupied by this feature (E:INV) on the scale. The EMHK subjects, on the other hand, displayed a great deal of variability of their intuitions and they

found inversion in yes-no questions more acceptable than the other two groups of students. More interesting still, findings from the native speakers on this feature indicated that they largely accepted uninverted yes-no questions to be grammatical, which stands in stark contrast with that observed among the Chinese medium students. Apart from this feature, it was also found that the relative position of the connective in embedded yes-no questions varies a great deal between the three groups of subjects. In general, when compared with the order established by the native speakers' of English, the EMHK order shows more similarities than that established by their Chinese medium counterparts. In sum, these results have two implications:

(a) the long established concept of the "natural order of development" in fact mirrors the learner's development only at the production level, in other words, it is a "control order", which in the case of the present study was found to be different from that established from the subjects' metalinguistic knowledge.
(b) the two examples given above provide some evidence that the retrieval of metalinguistic knowledge depends on whether sufficient time is given, as shown by a similar order established by the CMG and CMHK subjects from the written dialogue completion task.

One explanation for these findings is that what may account for the similar order of development with respect to the inversion rule is in fact a set of universal cognitive processes of language production available in L1 and L2 acquisition.

Another possibility is that there is a greater degree of indeterminancy in SL learner's judgments, which leads to the differences in the competence order between three groups of subjects. Sorace (1989) suggests that permeability of IL grammars may lead to greater variability and indecisiveness in learner's intuitions. Therefore, second language development may be regarded as a situation of decreasing indeterminacy tending towards native speaker's acceptability hierarchies as suggested by Ross (1979). Relating this discussion to the results of the present study, the acquisition orders established

by the three groups of subjects may be taken as an indication of their variable intuitions. Consequently, what is at issue here is whether these orders would subsequently merge or resemble that established by the native speakers. A recent study by Coppieters (1986) reveals that the underlying competence between very advanced learners and native speakers still shows significant differences.

4.4.2 The Relationship between the development of IL knowledge and Production Between the three groups of classroom learners

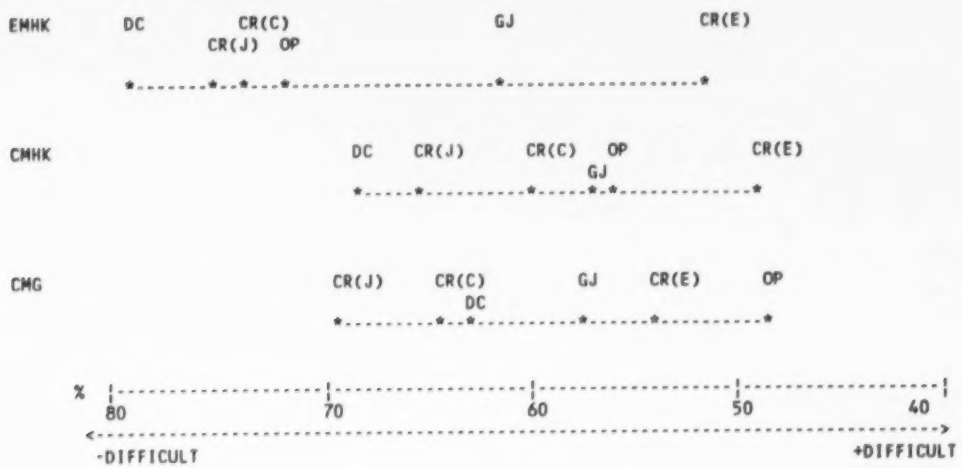
To further examine the issue of whether these classroom learners knew more than they could produce, our first procedure was to compare their performance on the tasks which were supposed to tap their knowledge of the target structures with those that involved retrieving knowledge of these structures in meaningful production. Appendix 2a and 2b present the percentages scores and the results of one-way ANOVA between the tasks as performed by the three groups of subjects. A point is in order here. For the sake of interest,the researcher decided to include the untimed judgments (CR(J)), which was the first step of the correction task, to contrast with the timed judgments.

The one-way ANOVA analysis revealed that each group of subjects performed differently between the elicitation tasks and the results were highly significant, all beyond 0.001 level. A post-hoc Scheffe test was conducted for each group to discover where the significant differences lie. The results of the Scheffe tests can be found in Appendix 2c.

The results from the Scheffe tests reveal that significant differences were found between the timed and untimed tasks. Within this framework of interpretation, better performance was found in tasks that were either untimed and/or involved emphasis on form than those that were timed and/or required the co-ordination of form and meaning. Although the grammatical explanation task (CR(E) also emphasized form, it was relatively more difficult to perform, especially for the Hong Kong subjects. The orders of task difficulty established by

the three groups of subjects are as follows:

Figure 3. Orders of task difficulty established by the three groups of classroom learners



The table shows that for all three groups of learners, the untimed grammaticality task (CR(J)), the correction task (CR(C)) and the written dialogue completion task (DC) are normally located towards the -difficult end of the continuum, followed by the timed tasks, suggesting that given sufficient time, classroom learners in general are capable of demonstrating their IL knowledge more successfully even in meaningful contexts.

Despite such similarities, differences were found. As regards the OP and DC tasks which involve situational dialogues but differ in the mode of communication, oral as opposed to written, the t-values between these two tasks as shown in Appendix 2c reveal that the discrepancy of the subjects' performance was found to be the greatest with the Chinese medium Guangzhou (**CMG**) subjects, followed by the Chinese medium Hong Kong (**CMHK**) subjects, but it was the least with the English medium Hong Kong (**EMHK**) subjects. This finding seems to indicate that the EMHK subjects were better able to retrieve both contextual knowledge and form almost regardless of whether the task is marked by automaticity or not. On the other hand, time is a significant factor for better performance with the two groups of Chinese medium subjects in general.

While the EMHK subjects, especially those at the S2 and S4 levels, were leading in their performance on the OP, DC and the GJ tasks, the results from the CR(E) task reveal that this group of subjects were largely inadequate in their ability to perform tasks which involve relatively more explicit metalinguistic knowledge, or 'articulated knowledge' in Bialystok's terms. The fact that it demands a higher degree of analyticity of IL knowledge did make the task relatively more difficult to perform although it concentrates only on form. On the contrary, it is the CMG subjects who outperformed the other two groups during the course of time, as revealed by the growing discrepancy between the scores at equivalent levels. Also, the consistently low scores between the P6 subjects of the three environments suggest that the development of metalinguistic knowledge, especially the ability of rule verbalization, is a rather late achievement. This finding is congruent with Sorace's results (1985) that the ability to make rules explicit is a relatively late attainment, even in a learning environment as formal as that found in Guangzhou where the students receive a greater amount of metalinguistic input.

Nevertheless, this does not imply that the IL knowledge of the HK subjects is down towards the unanalyzed end of the continuum. Despite the relatively poorer performance of the EMHK subjects in the CR(E) task, comparable performance in the CR(J) and CR(C) tasks was found at equivalent levels between the EMHK and CMG or the CMHK subjects, suggesting that the EMHK subjects are not disadvantaged at all despite the general lack of emphasis on grammatical input during their learning process, but they just failed to attain a higher level of analyticity.

On the other hand, although the CMG subjects fared better in tasks which tap form rather than function and were better articulators of grammatical concepts than their HK counterparts, they found performing under the pressure of time rather difficult, as shown by the position of the OP and GJ tasks on the scale of difficulty.

In sum, qualitative differences in terms of IL development automaticity and analyticity of IL

development were found between the three types of learners. In addiction, the general lack of significant differences in the CR(C) task between the EMHK and CMG or CMHK subjects as proficiency increases reveals the fact that the EMHK subjects could perform just as well on tasks tapping the +analyzed aspect of their IL knowledge. On the other hand, even though they started late in learning English, as proficiency increases, not only have the CMG subjects achieved a level of underlying competence comparable to the EMHK and CMHK subjects, but their IL knowledge is also qualitatively more analyzed than the other two groups. Even their level of automatic retrieval of IL knowledge is at a level comparable to the EMHK subjects by secondary 4.

5. Conclusion

The present results suggest that different learning environments do not necessarily create any effect on the 'natural order of development' but this claim is only valid so far as production is concerned. An analysis on the learner's developing intuitions reveal that they may be highly variable and the 'competence order' thus established does not necessarily coincide with the 'control order'.

Based on the framework of Bialystok's concept of analyticity and automaticity of IL development, it was found that the three groups of learners display qualitative differences in their development of IL knowledge and production. Learners having exposure to English as the medium of instruction display better development on the continuum of automaticity while those whose environment emphasizes an understanding of the formal structure of the target language show a better development of the degree of analyticity of their interlanguage. Such qualitative development as far as the formal learners are concerned appears to be crucial for determining the rate of IL development.

Reference

Adams, M.A. (1978) "Methodology for examining second language acquisition" Hatch, E (ed) Second Language Acquisition:A Book of Readings Rowley Mass.:Newbury House.

Anderson, Jr. (1982) "Acquisition of cognitive skills" Psychological Review 89:369-406.

Arthur, B. (1980) "Gauging the boundaries of second language competence: a study of learner judgments" Language Learning 30:177-194.

Bialystok, E. (1981) "A psycholinguistic framework for exploring the basis of SL proficiency." Paper presented at the BAAL Seminar, Lancaster 1981.

Bialystok, E. (1982) "On the relationship between knowing and using forms" Applied Linguistics 3/3: 181-206, Oxford University Press.

Bialystok, E. & Ryan,E.B. (1983) "Two dimensions in the development of metalinguistic ability" Paper presented in the Symposium in Metacognition: Development of Metalinguistic and Cognitive Skills." at the biannual meeting of the Society for the Research on Child Development,Detroit,1983.

Bialystok, E. & Sharwood Smith, M. (1985) "Interlanguage is not a state of mind: an evaluation of the construct for second language acquisition" Applied Linguistics 6/2:101-118.

Butterworth, G. & E. Hatch (1978) "A Spanish-Speaking Adolescent's acquisition of English syntax" in Hatch, E.(ed) Second Language Acquisition: A book of Readings Newbury House.: Rowley Mass..

Cancino, H.,Rosansky,E.J. & Schumann, J.H. (1978) "The Acquisition of English negatives and interrogatives by native Spanish speakers" Hatch, E. (ed) (1978).

Chen, J.P. (1986) "An Investigation of the Patterns of Learning English interrogative structures by EFL learners in China" unpublished M.Phil thesis, The Chinese University of Hong Kong.

Coppieters, R. (1987) "Competence differences between native and fluent non-native speakers." Language 63:544-73.

Corder,S.P. (1981) Error Analysis and Interlanguage Oxford University Press.

Dulay,H.& M.Burt (1973) "Should We Teach Children Syntax?" in Language Learning 23: 245-58.

Eckamn,F.R.,Moravcsik,E.A.,& Wirth,J.R. (1989)

"Impicational universals and interrogative structures in the interlanguage of ESL learners" Language Learning 39/2:172-205.

Ellis,R. (1984) Classroom Second Language Development Pergamon Press.

Ellis, R.(1985) Understanding Second Language Acquisition Oxford University Press.

Faerch,C. (1986) "Rules of thumb and other teacher-formulated rules in the foreign language classroom" Kasper, G. (ed) (1986).

Felix, S.(1981) "The effects of formal instruction on second language acquisition" Language Learning 31/1: 87-112.

Felix,S. & Hahn,A. (1985) "Natural processes in classroom second language learning" Applied Linguistics 6/3: 223-238.

Gass,S. (1983) "The development of L2 intuitions" TESOL Quarterly 17:273-91.

Huang, J. & Hatch,E. (1978) "A Chinese child's acquisition of English" Hatch, E. (ed).

Hulstijn,J.H. (1989) "A comparison between the information processing and the analysis/control approaches to language learning." manuscipt.

Kohn,K. (1986) "The analysis of transfer" in E. Kellerman & Sharwood Smith,M. (eds) Cross-Linguistic Influence in Second Language Acquisition Oxford:Pergamon Press.

Krashen, S. (1982) Principles and Practice in Second Language Acquisition Pergamon Press, New York.

Krashen,S. & Terrell,T. (1983) The Natural Approach: Language Acquisition In The Classroom Oxford: Pergamon.

Kwan, A.(1986) "The acquisition of word order in English and Cantonese interrogative sentences:a Singapore case study" in RELC Journal 17/1:14-39.

Li,C.& Thompson,S. (1981) Mandarin Chinese: A Functional Reference Grammar University of California Press.

Liceras,J.M. (1985) "The role of intake in the determination of learner's competence" in Gass,S. &
Madden,C.G.(eds) Input in Second Language Acquisition Rowley Mass.:Newbury House.

McLaughlin, B. (1987) Theories of Second Language Learning Edward Arnold.

Ravem, R. (1978) "Two Norwegian children's acquisition of English syntax" Hatch, E. (ed) (1978).

Ringbom,H.(1980) "On the distinction between second

language acquisition and foreign language learning" Language Learning and Language Acquisition 28: 37-44.

Ross, J.R. (1979) "Where's English?" Fillmore,C.J. et,al.(eds) Individual Differences in Language Ability and Language Behaviours New York :Academic Press.

Rutherford, W. (1986) Second Language Grammar: Learning & Teaching London: Longman.

Schachter, J. (1986) "Three approaches to the study of input" Language Learning 36/2:211-225.

Selinker, L.(1972) "Interlanguage" in IRAL Vol. X/3 (Reprinted in J.C.Richards (ed) Error Analysis (1974) London" Longman.

Sharwood Smith, M. & Kellerman, E. (1986) "The competence/control model: cross-linguistic influence and the creation of new grammars" Kellerman,E. & Sharwood Smith,M. (eds) Crosslinguistic Influence in Second Language Acquisition Pergamon Press.

Sorace, A.(1985) "Metalinguistic knowledge and language use in acquisition poor environments" Applied Linguistics 6/3: 239-254.

Sorace, A.(1989) "Linguistic intuitions in IL development: the problem of indeterminacy" Paper presented at the Lars Conference on "Cross-Linguistic Perspective in SLA" Utrecht 3-5 Sept., 1986.

Tang, G. (1991) "The acquisition of the English interrogatives: the effect of different learning environments on second language development" unpublished PhD thesis,University of Edinburgh.

Thompson, S. (1978) "Modern English from a typological point of view: some implication of the function of word order" in Linguistische Berichte 54: 19-35.

Ultan, R. (1978) "Some general characteristics of interrogative system" Greenburg, J.(ed) Universal in Human Language 4:Syntax University of Wisconsin-Milwaukee (1986) Linguistic Symposium on Markedness.

White, L. (1985) "Is there a logical problem of second language acquisition" in TESL Canada 2:29-41.

White, L. (1986) "Implications of parametric variation for adult second acquisition: an investigation of the pro-drop parameter." in Cook,V.J. (ed) Experimental Approaches to Second Language Acquisition Oxford, Pregamon press.

White, L. (1987) "Against comprehensible input" Applied Linguistics 8:95-110.
White, L. (1991) "Adverb placement in second language acquisition: some effects of positive evidence in the classroo" Second Language Research 7:133-161.
Wode, H. (1978) "The L1 vs L2 acquisition of English interrogation" Working Papers on Bilingualism 15: 37-57 Ontario, Canada.
Wode, H. (1981) Learning A Second Language: An Integrated View of Language Acquisition Gunter Narr Verlag Tubingen.
Zobl, H. (1982) "A direction for contrastive analysis: the comparative study of development sequences" TESOL Quarterly 16/2: 169-183.

Keys for the tables:

1. Learning environments

EMHK: English Medium Hong Kong
CMHK: Chinese Medium Hong Kong
CMG : Chinese Medium Guangzhou

2. Year of training

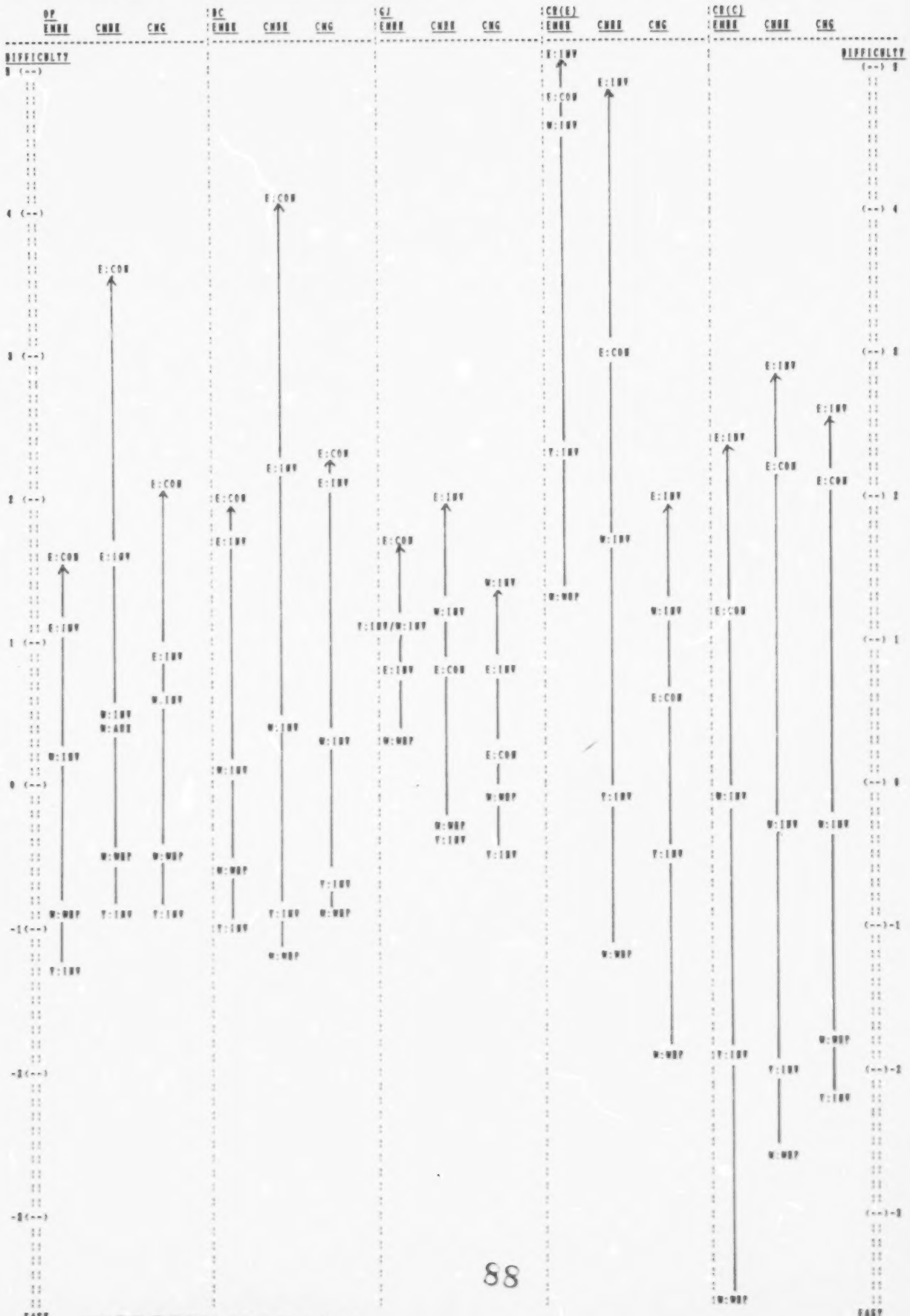
P6: Primary Six
S2: Secondary Two
S4: Secondary Four

3. Types of Tasks

OP : Oral Production
DC : Written Dialogue Completion
GJ : Timed Grammaticality Judgments
CR(E) : Correction (Explaining)
CR(C) : Correction (Correcting Errors)
CR(J) : Correction (Untimed Judgments)

4. Grammatical Features:

W:WH-P : WH-preposing in WH-Qs
W:INV : Inversion in WH-Qs
Y:INV : Inversion in YN-Qs
E:CON : Connective in EYN-Qs
E:INV : Non-inversion in EYN-Qs



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Appendix 1b. Rasch Statistics

(1) Oral Production

Group	SD	Reliability Index	Separation Coefficient
EMHK	1.658	0.909	3.15
CMHK	1.864	0.938	3.87
CMG	1.917	0.946	4.19

(2) Dialogue Completion

Group	SD	Reliability Index	Separation Coefficient
EMHK	1.555	0.880	2.70
CMHK	1.800	0.927	3.56
CMG	1.841	0.931	3.69

(3) Grammaticality Judgments

Group	SD	Reliability Index	Separation Coefficient
EMHK	0.887	0.742	1.70
CMHK	0.791	0.723	1.61
CMG	0.698	0.696	1.51
NS	1.011	0.677	1.45

(4) Error Correction(Explanation)

Group	SD	Reliability Index	Separation Coefficient
EMHK	2.185	0.936	3.83
CMHK	1.871	0.925	3.51
CMG	1.733	0.298	3.58

(5) Error Correction

Group	SD	Reliability Index	Separation Coefficient
EMHK	1.988	0.929	3.62
CMHK	2.048	0.947	4.23
CMG	1.723	0.931	3.68

Appendix 2a. Mean Percentage Scores of Elicitation Tasks

	OP	DC	GJ	CR(E)	CR(C)	CR(J)
EMMK	71.66	79.86	61.58	51.26	72.63	74.56
P6	57.44	64.29	52.83	33.61	44.71	46.36
S2	75.79	84.08	64.41	59.48	83.75	86.05
S4	81.74	91.21	67.50	60.68	89.42	91.26
CMMK	55.11	67.96	55.99	48.10	60.40	64.90
P6	41.68	52.71	48.70	31.80	39.61	44.83
S2	56.94	70.96	55.79	46.25	61.80	67.73
S4	66.72	80.21	63.47	66.25	79.80	82.14
CMG	49.60	63.31	57.18	53.37	64.44	69.45
P6	24.61	31.83	51.46	26.46	35.93	44.29
S2	52.33	70.62	54.58	57.34	67.70	71.26
S4	71.86	87.47	65.49	76.32	89.69	92.79

Appendix 2b. ANOVA: Subject's Performance Between Tasks

EMMK: Tests involving 'TASK' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	15593.87	220	70.88		
TASK	24199.04	5	4839.81	68.28	.000

CMMK: Tests involving 'TASK' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	11555.55	220	52.53		
TASK	11683.14	5	2336.63	44.49	.000

CMG: Tests involving 'TASK' Within-Subject Effect.

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	20410.98	220	92.78		
TASK	12543.72	5	2508.74	27.04	.000

Appendix 2c. Scheffe Tests: Subjects' Performance Between Tasks

(I) EMHK

		CR(E)	GJ	OP	CR(C)	CR(J)	DC
CELL MEANS		51.26	61.58	71.66	72.63	74.56	79.86
CELL TOTALS		2306.70	2771.10	3224.70	3268.35	3355.20	3593.70
CR(E)	2306.70	0	464.40*	918.00*	961.65*	1048.50*	1287.00*
GJ	2771.10		0	453.60*	497.25*	584.10*	822.60*
OP	3224.70			0	43.65	130.50	369.00*
CR(C)	3268.35				0	86.85	325.35*
CR(J)	3355.20					0	238.50
DC	3593.70						0

df = 220 N = 45 MSE = 70.88 k-1 = 6 F crit = 2.14 p = 0.05
F s = 12.84 t'crit = 286.20 *p = 0.05

(II) CMHK

		CR(E)	OP	GJ	CR(C)	CR(J)	DC
CELL MEANS		48.10	55.11	55.99	60.40	64.90	67.96
CELL TOTALS		2164.50	2479.95	2519.55	2718.00	2920.50	3058.20
CR(E)	2164.50	0	315.45*	355.05*	553.50*	756.00*	893.70*
OP	2479.95		0	39.60	238.05	440.55*	578.25*
GJ	2519.55			0	198.45	400.95*	538.65*
CR(C)	2718.00				0	202.50	340.20*
CR(J)	2920.50					0	137.70
DC	3058.20						0

df = 220 N = 45 MSE = 52.53 k-1 = 6 F crit = 2.14 p = 0.05
F s = 12.84 t'crit = 246.38 *p = 0.05

(III) CMG

		OP	CR(E)	GJ	DC	CR(C)	CR(J)
CELL MEANS		49.60	53.37	57.18	63.31	64.44	69.45
CELL TOTALS		2232.00	2401.65	2573.10	2848.95	2899.80	3125.25
OP	2232.00	0	169.65	341.10*	616.95*	667.80*	893.25*
CR(E)	2401.65		0	171.45	447.30*	498.15*	723.60*
GJ	2573.10			0	275.85	326.70	552.15
DC	2848.95				0	50.85	276.30
CR(C)	2899.80					0	225.45
CR(J)	3125.25						0

df = 220 N = 45 MSE = 92.78 k-1 = 6 F crit = 2.14 p = 0.05
F s = 12.84 t'crit = 327.44 *p = 0.05

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The Stress Patterns of Nonsense English Words of Cantonese-speaking ESL Learners[1]

Cathy Sin Ping Wong

ABSTRACT

This paper explores the issue of the acquisition of English word stress by ESL learners whose mother tongue is Cantonese. Based on the theoretical framework of metrical phonology detailed by Hayes (1981), this study examines the following parameters related to English word stress: branching versus non-branching rime structures, dominance in the metrical foot and the word tree, directionality of rule application and extrametricality.

160 English nonsense words were coined according to the parameters being investigated. Two groups of subjects (secondary and university students) were asked to read aloud the test words in sentence frames. The results demonstrated regular stress patterns, indicating that learners were sensitive to variables such as rime structures, syntactic categories and number of syllables. The regularity observed is consistent with the metrical framework adopted for analysis, which reflects the fact that the interlanguage system of learners can be explained in terms of the same types of principles of other natural languages. Some interesting irregularities also emerged, suggesting that learners were trying to resolve an inherent difficulty in the acquisition of English word stress -- learning that the metrical foot of the langauge is right-dominant while its word tree is left-dominant.

The study on how ESL learners acquire English word stress is important not only because it sheds light on the intricate system of interlanguage phonological system of ESL learners in the aspect of suprasegmental features, but it also reveals how they understand and learn the complex interaction of word stress with morphology and syntax in the English language. Before I describe the research design and present the findings and discussions of the

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[1]This paper is based on my M.Phil. thesis entitled *The Acquisition of English Word Stress by Cantonese ESL Learners* (1991) submitted to the Chinese University of Hong Kong . I would like to take this opportunity to thank Dr. Thomas Lee, who is the supervisor of my thesis, Dr. Teresa Ching and Dr. Eric Zee, who are on the thesis committee and Professor Fred Eckman, who is the external examiner of my thesis for their invaluable advice and comments. (Correspondence address: c/o Dept. of Linguistics, University of Hawaii at Manoa, 1890 East-West Rd., Honolulu, HI 96822. Email: spwong@uhccux.bitnet)

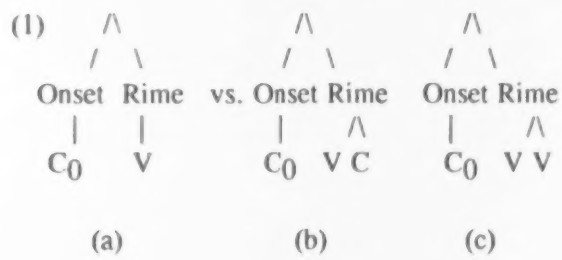
present study, I will briefly introduce the theoretical framework adopted for analysis, which is detailed in Hayes (1981).

1. Metrical Phonology -- Hayes (1981)

Hayes' (1981) doctoral dissertation investigated the stress systems of various languages, and established a metrical theory of stress which entails a set of universal parameters. Within such a framework, the stress patterns of various languages are highly predictable as long as the settings of several parameters are known. This is especially significant in attempting to describe and explain learners' patterns and errors in terms of parameter-setting (Flynn and Espinal 1985; Flynn 1987; Phinney 1987; White 1987).

Crucial to stress placement in Hayes' framework is the concept of **branching** versus **non-branching rime structures**, **extrametricality**, **stress rules** and **word tree construction**.

Rime structures, according to Hayes, enable us to distinguish a heavy syllable from a light one (or a strong from a weak one). Example (1) graphically illustrates the rime structures of weak versus strong syllables:



If a syllable is viewed to be composed of the onset and the rime, (1a) represents a rime structure with only a single vowel, (1b) a vowel plus a consonant, (1c) a long vowel or a diphthong (both can be considered to be geminates of vowels). Thus, (1a) is regarded as a non- branching rime, while (1b) and (1c) are branching. Hayes concluded that when considering stress placement, the distinction between a strong versus weak syllable could now be determined solely on the basis of the rime structure of a syllable.

Another factor which influences stress placement is **extrametricality**. 'In the metrical theory of stress, a syllable is called *extrametrical* if it is ignored by the stress rules; that is, treated as if it were not there.' (Hayes 1982: 227) This captures the insight that the final consonant of a word is extrametrical (i.e. treated as if it were not there when English Stress Rules are applied) and so is

the final syllable of a noun. Consonant Extrametricality accounts for the fact that final VCC rimes are treated as weak syllables (VC). Similarly, Noun Extrametricality accounts for the rarity of finally-stressed nouns and the difference in primary stress of the noun/verb pairs such as 'ABstract' (noun) / 'abSTRACT' (verb).

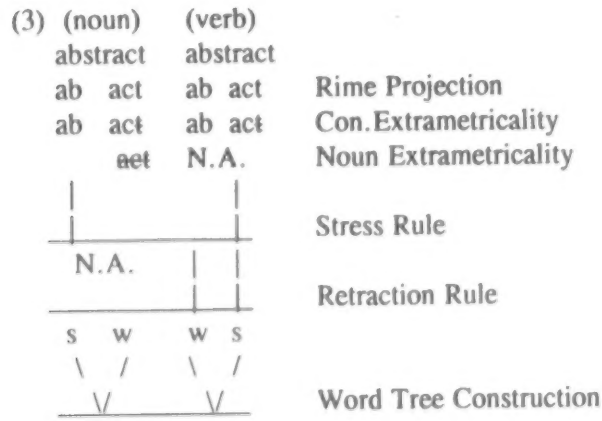
In Hayes' framework, the **English Stress Rule** is as follows:

(2) English Stress Rule (Hayes,1981: 150)
At the right edge of the word, form a binary foot on the rime projection, with the left node dominant.

According to Hayes, the stress rules assign stress foot status to the rimes. What (2) means is that if the final rime branches, it receives the foot status; if it does not, it is the weak node and correspondingly, its sister node (the left one) will be strong.

After the stress rules have assigned stress foot status to the rimes, these feet are constructed into a right-dominant **metrical word tree**. These two processes relate to the notion of dominance. In Hayes (1981), he explains that the world's languages differ in whether they are right-dominant or left-dominant at both the syllable level and the foot level. If a language is left-dominant, then only the left node may branch; and, by the same token, only the right node may branch in a right-dominant case. In English, the foot structure is left-dominant while at the word level, it is right- dominant. Example (3) illustrates the derivation of stress placement in the noun 'ABstract' and the verb 'abSTRACT':

(3)



The metrical theory of Hayes has made it possible for researchers to identify the areas for investigating the acquisition of English word stress. In

acquiring the word stress of English, learners have to be aware of a number of properties of the metrical structure before they are able to acquire the stress pattern of English. These properties include:

(4) (a) branching versus non-branching rime structure
(b) foot construction
(c) word tree construction
(d) extrametricality

2. Studies on the Acquisition of Stress by ESL learners

Several studies have been done on the acquisition of English word stress of ESL learners (Baptista 1989; Mairs 1989).

Baptista (1989) examined the errors made by ESL learners whose mother tongue was Brazilian Portuguese. She found that her subjects employed some strategies which sometimes overlapped and sometimes conflicted with the stress rules, resulting in the errors recorded.

The first strategy she mentioned relates to transfer from the mother tongue. She examined the stress pattern of English words which had Portuguese cognates and found that the most common type of transfer was that the subjects put the primary stress in the English words on the syllable which bore secondary stress in Portuguese cognates. She concluded that the learners seemed to be aware of the fact that the two languages did not correspond to each other in their stress pattern, but somehow, they `cannot control the natural and probably unconscious tendency to look for at least an indirect correspondence'(Baptista 1989: 6).

The second phenomenon observed by Baptista is that learners have a tendency to stress an `early syllable'. This means that learners tend not to stress the final syllable of an English word. This strategy accounts for the high percentage of correct responses in test words which are predicted to have primary stress on the second syllable on the one hand and poor performance in words which are predicted to be finally-stressed (e.g. kangaroo, employee) on the other.

Mairs (1989) employed the metrical theory to explain some of the errors found in her Spanish subjects' pronunciation of English words. She found that in general the Spanish speakers she investigated demonstrated stress patterns very similar to those of the native speakers. However, there is a set of errors which can be explained in terms of the metrical theory. She discovered that the subjects of her study had a general tendency to stress the syllable which was in a -VGC# rime configuration. For example, 'adVERtisement' will be stressed as

'adverTISEment', 'INterview' will be pronounced as 'interVIEW'. She compared the Spanish and the English stress system within the theoretical framework of Hayes (1981). It was explained that in the Spanish stress system, the -VGC rime was a marked rime structure for the Spanish subjects. And this prevents the application of the English Extrametricality Rule to this rime structure. This adjustment in the stress assignment process results in the incorrect output of these subjects. Mairs has demonstrated that by employing the metrical theory, the interlanguage system of some ESL learners is better understood.

The present study intends to explore the stress patterns of Cantonese-speaking ESL learners in the light of the metrical theory.

Since the metrical theory of Hayes has formalized some universal parameters of stress, the stress patterns of the ESL learners can be analyzed along the setting of the values of these parameters.

The main objective of this study is to identify and examine the stress patterns of Cantonese ESL learners. Are these patterns approximate those of the native speakers' as described by Hayes (1981)? Are learners sensitive to branching versus non-branching rimes, syntactic categories and the structure of metrical feet and word trees? Will there be any strategies employed by learners reflected from their patterns?

3. Methodology

Based on the consideration of branching versus non- branching rime structures, 40 different syllable types were identified to test 2-syllable nouns and verbs, 3- syllable nouns and verbs and 4-syllable nouns. For each syllable type, 4 test words were coined, making a total of 160 nonsense words. These words were put in 2 sentence frames like the ones listed in (5) below:

(5) (a) I can _____. (verb)
(b) This is a nice _____. (noun)

Subjects were asked to make recordings of the 160 sentences, but they were not told that word stress was the focus of this study. The subjects of this study included 8 university students, 8 secondary students of F.4 (Grade 10) level and 2 native speakers of English. Broad transcriptions were made of the recordings with the primary stress identified, based on perceptual judgment of two transcribers. Words with the intended syllable structures maintained were then tallied for an item analysis. Examples of some of the results of the item

analysis are given in the appendix.[2]

The stress patterns of the subjects were classified into the regular and irregular types. This is reflected in two levels -- the individual test word level and the syllable type level. At the test word level, regularity is revealed by the number of responses for each individual test word. If all 8 subjects (or the majority of the subjects[3]) assigned stress to the same syllable for a test word, that particular test word is assumed to have a regular pattern (e.g. 'toisapaw' in Table 1). At the level of syllable structure, the stress pattern of a certain syllable type is revealed by the number of `regularly-stressed' test words. Since each syllable type consists of four test words, if all four test words (or 3 out of 4) with the same syllable structure consistently have the same syllable receiving the stress placement from the majority of subjects, that syllable type is considered to have a 'regular' stress pattern. The test results in Table 1 indicate such a pattern. If either one of the two criteria is not satisfied, the stress pattern is regarded as 'irregular', such as that shown in Table 2.

4. Findings

Table 3 in the Appendix summarizes the stress patterns observed in the present study. For ease of reference, some notational conventions are employed. Since the syllable structures are based on a branching versus non-branching concept, B is used to indicate a syllable with a branching rime and an N for one with non- branching rime structure. For example, a BN refers to a 2-syllable test word in which the initial syllable has a branching rime while the final syllable has a non- branching one.

Among a total number of 40 types of test words (12 types of verbs and 28 types of nouns of different syllable structures), 30 of them showed regular and rule- predicted patterning, only 10 of them showed irregular patterning. Moreover, verbs and nouns of the same syllable structures showed different stress patterns, indicating that subjects were sensitive to syntactic categories

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[2] The tables referred to hereafter are all included in the appendix.

[3] In some cases, such as the 4-syllable test words, most of the secondary students were unable to give a response that was without modifications of the intended syllable structures. The number of responses tallied was thus very low. Therefore, the pattern of such items will be based on the results of the university students.

when deciding on word stress. In the following sections, the results of 2-syllable nouns and verbs will be examined first; then followed by the 3- syllable nouns and verbs and finally, the 4-syllable nouns.

2-syllable words

Of all the four types of BN, NN, BB and NB 2-syllable verbs, (e.g. kouba, haca, abnaw, bagoy etc.), the BN and NN types showed regularity while the BB and NB types did not. When the test words in these two categories were further scrutinized, it was found that three of the test words ending in final VV attracted the stress onto the final syllable, while the other four test words which did not end in VV but VCC rime structure resulted in more subjects placing the stress one syllable earlier, on the penultimate syllable, which was not predicted by rule. Thus, irregular patterns emerged. The findings suggest that identifying a sub-class of final rimes (i.e. the VV final rime in this case) as stress-bearing may be one of the strategies employed by some ESL learners. This shows that learners are indeed sensitive to rime structures.

On the other hand, all the four types of BN, NN, BB and NB 2-syllable nouns (e.g. harsi, nita, teewaw, mitern etc.) with the same rime structure as the 2-syllable verbs received regular stress patterning. This reveals that learners are indeed sensitive to verb/noun distinction when considering stress placement.

3-syllable words

In 3-syllable verbs, 4 of the 8 syllable types yielded regular patterns. These syllable types are NNB, BNB, BBN and NBN (e.g. melabaw, toisapaw, poiveytik, setaiba etc.). They are of the rime configuration of either an XNB or an XBN type (X can be branching or non- branching). In all the four cases, the stress patterns of the subjects correspond to that predicted by rules. On the other hand, words of the syllable types BBB, NBB, BNN and NNN (e.g.bawtigpai, belailai, tarweta, hipisa etc.) did not yield regular stress patterns. These syllable types, which presented problems for the ESL learners, are either in an XBB or XNN configuration of rime structures, with identical rime structures in the last two syllables.

One might speculate that the irregularity is due to the deviation of these rime structures from the canonical `strong-weak' form of an English metrical foot. The regularly-stressed types are of the configurations of either XBN or XNB. The last two syllables of the XBN type are in accordance with a canonical left-strong metrical foot. As for the XNB type, the final syllable is a branching rime, which automatically becomes a metrical foot by itself; leaving

the remaining two syllables to form a branching left-strong metrical foot, which goes in accordance with the canonical nature of a left-strong metrical foot. This is easy for learners. The XNN type shows irregular stress patterning because a metrical foot formed by two consecutive NN syllables with the left node dominating a non-branching rime is a non-canonical one. Learners may be unwilling to assign primary stress to a non-branching syllable, forming a non-canonical foot. Similarly, the XBB type results in a branching rime being dominated by the weak node of a metrical foot, violating the canonical left-strong nature of a metrical foot.

In contrast to the verbs, the stress patterns of the 3-syllable nouns are much more regular. If the penultimate syllable is a non-branching rime, in the cases of NNB, NNN, BNB and BNN (e.g. leisitay, pacaba, moulikoy, farnita etc.) the stress falls on the antepenultimate syllable. In all other cases, that is, NBB, NBN, BBB and BBN (e.g. dikaimoy, saberna, laitapzaw, tarharlin), in which the penultimate syllable is a branching rime, the words are stressed penultimately.

4-syllable words

Half of the 4-syllable nouns (i.e. 8 types) showed regular stress patterns; a quarter showed irregularity. The remaining one quarter fell in between the two (cf. Table 3). Instances in which subjects placed the stress on the final or initial syllables were extremely rare. Among the 16 syllable types of the 4-syllable nouns, 12 types showed a different tendency for penultimate or antepenultimate stress. These syllable types of the regularly-stressed test words can be divided into three configurations. For words of the configuration of XBNY (e.g. toizetmazaw, nawtikmita, wipoisikay, ditaysila etc.) and XNNY (e.g. tawpabelai, terniseba, tapibelai, tetiseba etc.), the stress was placed on the ante-penultimate syllables by learners, the same as predicted by rule. For words of the configuration XNBY (e.g. filiboitai, dagataiga, leesikatpai, daitipoosin etc.), the penultimate syllables were stressed by learners, again as predicted by the stress rules. The remaining four syllable types which did not reveal any regular stress patterns are of the configuration XBBY. In all the cases of the BBBB, BBBN, NBBB and NBBN syllable types (e.g. laitipmagtye, teepikmawtet, feparvindai, mitoiseenit etc.), the stress was found to fall either on the penultimate or antepenultimate syllable with no particular tendency observed.

5. Discussion

Having presented the overall stress patterns of the subjects of the present study, I discuss below these results with reference to the issues related to English word stress and second language acquisition.

5.1. The Metrical Theory and the Stress Patterns of ESL Learners

It has been pointed out in Section 4 that 30 out of the 40 syllable types yielded regular stress patterns which are in accordance with those predicted by the metrical theory. This shows that the interlangauge system of these ESL learners conform to the same types of principles governing other 'natural languages, that is to say, 'primary languages' (Eckman, personal communication).

In this section, the results of this study are examined in detail with reference to the various components of the metrical theory.

5.1.1. Rime Structures

So far, it has been shown that the ESL subjects in this study are sensitive to branching and non-branching rime structures. Nevertheless, careful examination of the data indicates that they may have a slightly different concept of branching from that of the native speakers as described in the metrical theory of Hayes (1981).

There are four types of rime structures which are being investigated in the present study: VV (a long vowel or a diphthong), VCC (a short vowel plus at least two consonants), VC (a short vowel plus one single consonant) and V (a single short vowel). According to the metrical theory of Hayes, because of Consonant Extrametricality in English, branching rimes when appearing finally are VV and VCC while non-branching rimes are VC and V. In non-final position, only a V rime will be non-branching. This branching versus non-branching rime structure dichotomy dictates the operation of English word stress assignment.

From the data gathered from the ESL learners in this study, there is evidence that these subjects, though sensitive to the concept of branching rime structure, may have a different assumption about what constitutes a branching or non-branching rime. For some subjects, only the VV rime structure is considered as branching, while all the other three (VCC, VC and V) are treated as non- branching, regardless of whether they appear finally or non-finally.

In the 2-syllable verbs with rime structure types BB and NB (Tables 4

and 5), test words with a VV rime in both types received predominantly final-stress responses. However, test words with a VCC final rime showed penultimate stress contrary to rule.

Similarly, the 2-syllable nouns generally received penultimate stress, as predicted by rule. However, more final-stress responses were recorded if the final rime was VV than if it was VCC (Tables 6 and 7).

A similar observation is also made about the VV/VC distinction in some 3-syllable nouns. In Table 8, the number of rule-predicted penultimate-stress responses was greater in `tarHARlin' and `gabSOOma' (both of a penultimate VV rime) than in `takDEMlit' and `kawTIPna' (both of a penultimate VC rime). In other words, some subjects treated a non-final VV rime as branching but a non-final VC rime as non-branching and so shifted the stress to the antepenultimate syllable.

The above observations lead us to hypothesize that in the process of acquiring English word stress, the identification of a branching rime structure is among many of the features that have to be learnt. Furthermore, learners start with a simple dichotomy that treats only a VV rime as branching, with VCC, VC and V rimes considered non-branching. In other words, the coda may be ignored in the definition of a branching rime.

5.1.2. Extrametricality

(A) Consonant Extrametricality

According to Hayes, Consonant Extrametricality applies to the right edge of an English word before stress assignment is considered. This is useful in distinguishing a VC rime structure in final from non- final position. Since a VC syllable in final position behaves as if it were a non-branching rime but in non- final position behaves like a branching rime, Hayes proposes the rule of Consonant Extrametricality so as to give an account of the behaviour of the VC syllable in terms of the rime branching concept.

The stress patterns of the ESL learners of this study show that they treat final VC syllables as non- branching rime structures. (cf. the results of 2-syllable verbs in Tables 9 and 10[4] ; the data on 3-syllable verbs in Tables 11

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[4] Note the difference in performance of the two groups in the word `vekan' in Table 10.

and 12).

However, the treatment of a final VC syllable as non-branching may not have been due to operation of Consonant Extrametricality in the ESL learners. As discussed in Section 5.1.1. above, the ESL learners had a tendency to treat only syllables with VV rimes as branching. Then the VCC, VC and V syllables are regarded as non-branching. Viewed in this way, Consonant Extrametricality may not have been assumed by the ESL learners. Learners following this pattern would therefore not have stressed any final syllable with a consonant coda, giving the impression of observance of Consonant Extrametricality.

(B) Noun Extrametricality

In Hayes' theory, the difference between syntactic categories is accounted for by Noun Extrametricality. If the word is a noun, the entire final rime structure is excluded when stress rules apply.

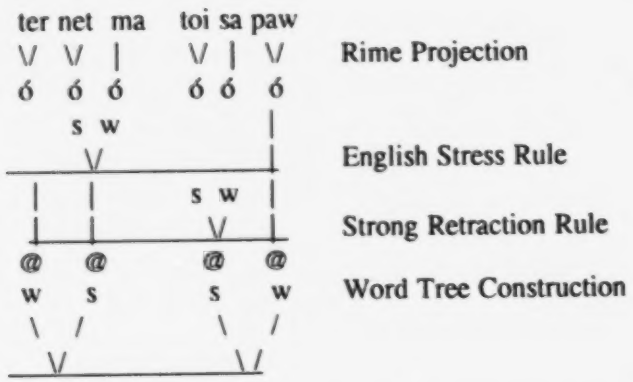
It is one of the hypotheses of this study that syntactic category does play a part in learners' placement of stress. This has been verified by the present investigation. If the learners had not treated the two categories differently, the same syllable rime structures should have yielded exactly the same stress patterning regardless of whether the word is a noun or a verb. As shown in Table 3, the stress patterns show that if the word with a BB or NB rime structure was a verb, the stress fell on the final syllable, but the stress was on the penultimate syllable in nouns (cf. Table 4 for BB verbs, Table 6 for BB nouns; Table 5 for NB verbs and Table 7 for NB nouns). With respect to the 3-syllable BBB, NBB, BNN and NNN types, the stress patterns of the nouns appeared rather regular but those of verbs were irregular. Thus, it is clear that the learners were sensitive to the syntactic category of the word concerned when assigning stress to it. But should this knowledge be captured in the form of Noun Extrametricality in the ESL learners' interlanguage system or should it be described as the effect of a learner strategy?

The data from the present study indicate that except for the 2-syllable verbs, no final-stress patterns were observed. Could the exclusion of the final syllable, therefore, have been the result of a simple strategy of avoiding stressing the final syllable, since exposure to English would give evidence to learners that English words of three syllables or more, are rarely stressed finally?

Since the lack of final stress in 2-syllable nouns can be attributed to either Noun Extrametricality or the strategy of avoiding final syllables, an examination of the 2-syllable words will not shed light on this issue. Let us consider the 3-syllable words.

Within Hayes' metrical theory, if the rime structure of the final syllable in a 3-syllable verb is non- branching, it automatically becomes the weak node (and its sister node or the adjacent syllable strong); the final two syllables thus form a metrical foot. The remaining first syllable builds a single-node foot after Strong Retraction Rule. The output of this process is that the penultimate syllable receives the primary stress. On the contrary, if the final syllable consists of a branching rime structure, a foot is automatically constructed and the primary stress invariably falls on the antepenultimate syllable because the Strong Retraction Rule will assign a left-strong foot to the remaining two syllables, yielding a branching left foot in the final step of Word Tree Construction. Therefore, in a 3-syllable verb with a final branching rime, the primary stress falls on the antepenultimate syllable. The examples in (6) illustrate this.

(6)



The pattern of not placing the stress in the final syllable of 3-syllable verbs may be explained in terms of the theory explicated above. As in the case of 2- syllable verbs, this however, can also be attributed to a simple learner strategy of ignoring the final syllable in 3-syllable verbs. But additional evidence goes against the learner strategy hypothesis. If it was the case that learners were simply avoiding the final syllable,one should expect that the same stress pattern will emerge for the syllable types BBB and BBN (cf. Table 11 and Table 13) of the 3-syllable verbs. This is because if the final syllable was ignored, the remaining two would be exactly the same, and thus the stress pattern of BBB and BBN words should be no different from each other. Similarly, pairs which differed only in final syllable rime structure such as BNB and BNN, NBN and NBB as well as NNB and NNN should have nearly identical stress assignment. However, the results demonstrate that they show strikingly different patterning. In all these pairs, only those with a XBN or

XNB rime combinations showed regular tendencies, while those in the configurations of XBB or XNN were irregularly patterned. This indicates that the final syllable plays an important role in stress assignment in 3-syllable verbs. In other words, the simple learner strategy of ignoring the final syllable in 3-syllable verbs is not the reason accounting for the lack of final- stress patterns in three-syllable verbs.

Based on this analysis, we could argue further that the avoidance strategy for 2-syllable nouns should also be rejected in favour of Noun Extrametricality.

The avoidance strategy hypothesis would give rise to further false predictions: it would predict that the 4-syllable nouns would be stressed like those 3-syllable verbs. If the final syllable played no role, all the different 16 types of rime structures could be collapsed into exactly the same 8 types designed for the 3-syllable verbs. The stress patterns of, for example, the BNBB and BNBB types of 4-syllable nouns should have a stress pattern identical to the BNB type of 3-syllable verbs. This is obviously not the case, since a BNB verb (Table 14) should be stressed initially according to rule, a pattern borne out by the stress patterns of the learners. However, the words in the BNBB and BNBB 4-syllable nouns (Tables 15 and 16) showed no initial stress at all as predicted by the theory. The fact that none of the 4- syllable nouns showed an initial stress pattern proved the avoidance hypothesis wrong.

Noun Extrametricality treats the final syllable of a noun as if it were not there when the English Stress Rule is applied. However, this is not equivalent to saying that the syllable should be avoided or that it plays no role in the assigning of stress. In the course when the word tree is being drawn, the extrametrical syllable is adjoined to a preceding foot and becomes a weak node.

5.1.3. Directionality

In English, the stress rule works leftward from the final syllable, and this is where a speaker or learner starts to look for relevant information, such as information about rime structure. If one is not aware of this, or is trying to work from the opposite direction, the English stress system will appear very chaotic to him.

A careful examination of all the patterns in the various categories reveals that the learners exhibit a sense of direction when deciding which syllable in an English word is to be stressed. The regular patterns described in Section 4 can all be accounted for in terms of the learners' sensitivity to final branching in verbs and the application of Noun Extrametricality exhibited by the learners (discussed in the previous section). And the results show that learners are sensitive to the directionality of rule application in English word stress, which is

from right to left. In the 2-syllable verbs, the determining factor is the final syllable -- if it is a VV rime, it receives the stress; otherwise, the stress falls on the preceding syllable. In the 3- syllable verbs, stress falls on the penultimate syllable in the case of a BN final while in an NB case, the stress is on the antepenultimate syllable.

In the noun category, we have established that the learners find the final syllable extrametrical. Therefore, in 2-syllable nouns, the only choice is to stress the penultimate syllable. In 3-syllable nouns, since the final syllable is ignored, what matters is the penultimate one -- if it branches (B), it is stressed; if not, then the antepenultimate syllable is stressed. The 4-syllable nouns are stressed in a similar way to the 3-syllables -- if the penultimate rime is branching, it receives the stress; otherwise, the stress falls on the preceding syllable; if not, the branching penultimate syllable receives the stress. However, in the case of a penultimate branching syllable with an adjacent antepenultimate branching, the learners seem to encounter some difficulty in deciding which syllable should receive the stress. This problem will be discussed in the next section. In the meantime, regardless of this exception, the stress pattern of these ESL subjects does indicate that they are sensitive to directionality in assigning English word stress.

5.1.4. Irregular Stress Patterns

All of the regular patterns presented in Table 3 conform to the output as predicted by the metrical theory.

However, there are three types of irregular patterns exhibited in the data. Such irregularity can also be explained in terms of the present theory. The first type of irregularity in fact has been discussed and explained (Section 5.1.1) in terms of the inability of the secondary students to stress a VV final rime.

The second type concerns the 3-syllable irregular verb types. For 14 out of the 16 test words, the numbers of penultimate and antepenultimate stress are quite close to each other. This indicates that the subjects may have been employing different rules. According to the metrical theory, the BBB and NBB structures should be stressed antepenultimately and the BNN and NNN are stressed penultimately when they are verbs, but the reverse should be the case when they are nouns. In other words, the responses of the subjects of these four types can be classified as those that are rule-predicted and those that are not rule-predicted. If we examine those responses not predicted by rule, the stress patterns of the 3-syllable verbs of these syllable types have exactly the same patterns as those in 3- syllable nouns of the same syllable types.

(7)

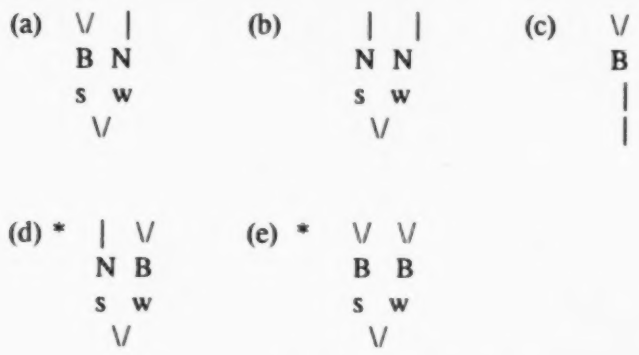
3-syllable Verbs	3-syllable Nouns
Rule-predicted	Rule-predicted
B B B	B B B
N B B	N B B
B N N	B N N
N N N	N N N

It is suggested, therefore, some of the subjects over- generalize the Noun Extrametricality Rule to all three syllable words. For other subjects, only the final syllables of 3-syllable nouns are subject to Noun Extrametricality, and the verbs are not affected, yielding different patterns in the verbs and nouns.

The other type of irregular pattern involves the 4- syllable nouns which are of the configuration of XBBY (X and Y can be B or N). The results show that quite a considerable number of subjects placed the stress on the antepenultimate syllable, which is not rule-predicted. We argue that the incorrect output may be due to the modification of the Strong Retraction Rule.

In describing the stress patterns in terms of metrical theory (Hayes 1981), English is found to have binary left-dominant feet. This means that in the metrical foot, only the left node may branch. Therefore, there are only three possible types of well-formed foot structure in English:

(8) Foot Structures created by English Stress Rule



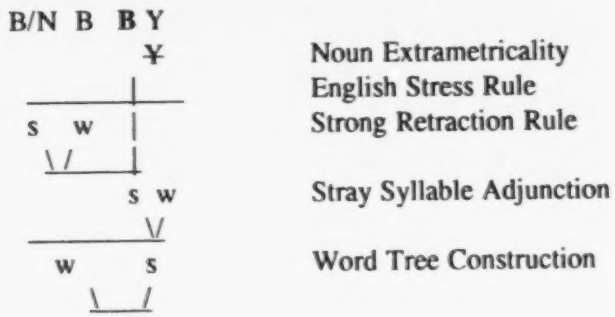
It can be seen that only a non-branching rime can be dominated by a weak node, if the rime is branching, it must be a foot on its own or the left strong node of the foot.

Let us examine the Strong Retraction Rule, which is repeated here for reference:

(9) Strong Retraction Rule (Hayes' 1981)
Form quantity insensitive, left dominant feet, going from right to left across the word.

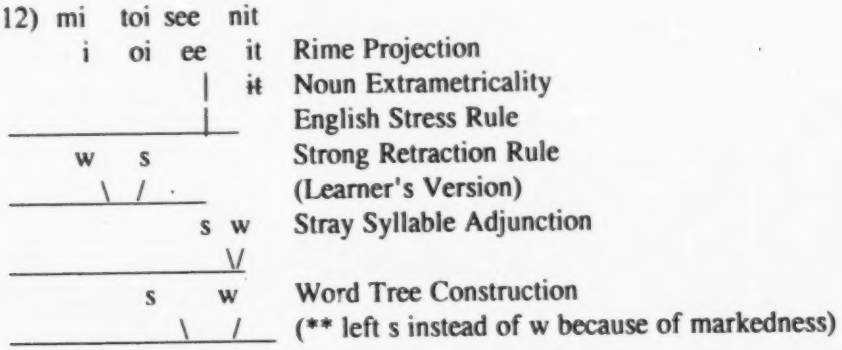
Some feet of the ill-formed types as those in (8d) or (8e) will be created by the Strong Retraction Rule especially in the case of the XBBY rime structures.

(10) Foot structures created by Strong Retraction Rule



(11) Strong Retraction Rule (Learner's version)
Form quantity sensitive binary feet, going from right to left across the word.

(12)

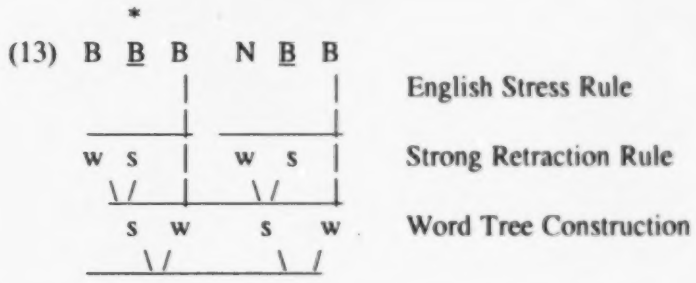


The derivation in (10) shows that the Strong Retraction Rule creates an s w foot to a BB rime structure, which does not conform to the well-formedness of the default foot structure. Therefore, the conjecture here is that for some subjects, the Strong Retraction Rule constructs foot in accordance to the default -- only the strong node can dominate a branching rime and a non-branching rime must be dominated by a weak node.

Thus a foot conforming to the English Stress Rule will be built instead of the one proposed above. For these learners, the derivation of an XBBY word will be as in (12).

The example in (12) illustrates how a right-dominant foot is created by the learners' Strong Retraction Rule. This foot is a `marked' one because according to the English Stress Rule, all the feet created should be left-dominant. Therefore, it is further conjectured that because of this `markedness', the foot attracts the primary stress, altering also the nature of the word tree as well. This also points out the fact that there is an inherent conflict between syllable quantity and the left- dominant foot structure in English word stress assignment. When encountering words of more than three syllables, the learners are faced with the dilemma of having to decide whether the syllable structure or the foot structure is more determinant.

This revised version of the Strong Retraction Rule may also contribute to the incorrect stress pattern in the 3-syllable BBB and NBB verbs.



Although the discussion concerning the irregular patterns is merely conjectural and is subject to further confirmation from future research, it is worth noting that both the regular and irregular patterns can be explained by the metrical theory.

5.2. Second Language Acquisition

5.2.1. Learners' Strategy

Earlier discussions in this chapter have shown that the acquisition of English word stress is a complicated process which involves the ability to identify the various parameters that are relevant, and of equal importance, an understanding of the interaction of these parameters. However, in the initial

stage of acquisition, ESL learners may have difficulties in both of these. This is shown when learners begin to cope with language learning problems by some learners' strategies.

There is one subject in this study whose stress placement is based on syllable position. Subject 07, a secondary student who scored the least in the pronunciation test[5] (the score was 17 out of 50), placed the stress on the final syllable for almost all the 2- syllable nouns and verbs. Out of all his 29 responses with the intended syllable structures preserved, 27 words received final stress (i.e. 93% of the cases). For the 3-syllable verbs and nouns, in 49 out of the 58 (i.e. 85% of the cases) responses with the intended syllable structures preserved, the stress was placed on the penultimate syllable. However, such a syllable position- based strategy was not apparent in 4-syllable nouns. Out of the 52 responses with the intended syllable structures preserved, 22 indicated penultimate stress and 29 indicated antepenultimate stress (1 on final). And this distribution was not patterned according to syllable types but random. That is to say, for the 4 test words of each of the syllable structure types, some were penultimately-stressed and some were antepenultimately-stressed. No pattern or strategy of any type could be discerned from the responses. This indicates that the stress placement of this subject in the 4-syllable words is randomly distributed between the penultimate and antepenultimate syllables. Since this subject represents an elementary stage of development in learning English (reflected from the low score he obtained in the pronunciation test), an approach to stress assignment based on a fixed syllable position may illustrate a very elementary strategy for handling word stress by ESL learners. A certain syllable is identified to receive the primary stress in a word of a certain length, such as the final syllable in a 2-syllable word, the penultimate syllable in a 3-syllable word and so on. Since the same strategy does not appear in the 4-syllable words, it is suspected that this rudimentary strategy is sensitive to the number of syllables in a word. Moreover, because of the random responses in the 4-syllable words and the syllable-based pattern observed in the 2 and 3-syllable words, it is speculated that word length in terms of number of syllables is an obstacle in determining stress placement.

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5 A pronunciation test was incorporated in the present study to test the proficiency level of the subjects. This part has not been included in the paper because of space limitations.

5.2.2. L1 Transfer

In acquiring the sound system of a second language, a learner is inevitably influenced by his mother tongue, both phonetically and phonologically. Therefore, in the acquisition of English word stress, it will be more likely for a learner whose L1 also demonstrates word stress to transfer the stress patterns of his L1 to L2 than one whose L1 does not have word stress. However, the lack of such a phonological category in L1 may induce other kinds of transfer. For example, Cantonese is said to be a syllable-timed language in which each syllable carries about the same amount of time. This may lead to transfer to English in the form of a lower degree of vowel reduction which is essential in the production of English word stress. Furthermore, even if they are sensitive to English stress rules, Cantonese speakers may have problems in approximating native norms in realizing word stress. They may experience difficulties in making full use of duration, intensity and pitch change to achieve the surface phonetic effects of stress. For example, it was observed impressionistically by the author that though the primary word stress produced by most subjects in this study could be discerned, it was not possible to distinguish a secondary level or third level of stress in their production. The effects of L1 transfer, at the phonetic level, should be of great interest but will require a separate acoustical study of L2 speech production which falls outside the scope of the present research.

Previous studies on the acquisition of word stress by speakers of Brazilian Portuguese speakers (Baptista 1989) and Spanish speakers (Mairs 1989) find that L1 transfer is present in the interlanguage system of ESL learners. Baptista (1989) found that her subjects placed the primary stress of English words at a syllable where in the Portuguese cognate, that same syllable should receive the secondary stress. Mairs (1989) found that L1 transfer among her Spanish subjects was present in their rime structure. The markedness of a -VGC# in Spanish blocks Extrametricality in the derivation of stress. The results of this study show that L1 transfer of the types described above is not present in the acquisition of English word stress by Chinese ESL learners, at least not in terms of stress assignment.

6 Conclusion

The present study has investigated the acquisition of English word stress employing the metrical framework. In the metrical theory, stress assignment is stated explicitly in terms of a set of parameters which include the concepts of branching rime structure, dominance in foot and word tree construction,

directionality in rule application and extrametricality. These parameters are found to be relevant in the acquisition of English word stress by ESL learners. In general, learners are sensitive to the concept of branching versus non-branching rimes. However, it was found that in the classification of branching and non-branching rime structure, the subjects of this study only regarded a VV (i.e. a long vowel or diphthong) but not a VCC (i.e. a short vowel followed by two or more consonants) as branching. This accounts for some of the stress patterns not predicted by rule. Learners were also found to have demonstrated the construction of right-dominant metrical feet and left-dominant word trees in the course of stress assignment. The difference of stress patterns in the syntactic categories of nouns and verbs illustrated that Noun Extrametricality played a role in determining stress in the interlanguage of the learners. In addition to this, the directionality of rule application was shown in the stress patterns as well. In short, it was found by the present study that the stress patterns of the ESL learners of some coined English words can be accounted for in terms of the parameters set out in the metrical theory.

From the point of view of second language acquisition, stress appears to be acquired early. In terms of rule-predicted responses, there was little difference shown by the two groups, the proficiency level of which indicated considerable difference. Learner strategy was found to be present in one of the subjects, who relied on the syllable position to assign stress. The stress patterns of this subject showed the strategy of stressing the final syllable in 2-syllable words, the penultimate syllable in 3-syllable words and stress either the penultimate or antepenultimate syllable in 4- syllable nouns.

The transfer of Cantonese in stress placement is not detected in this study. The absence of lexical stress in Cantonese does not appear to create a lot of difficulty to ESL learners in their acquisition of English word stress.

References

Baptista, B.O. 1989. Strategies for the Prediction of English word stress. *IRAL*, 27: 1-13.

Flynn, S. 1987. Contrast and Construction in a Parameter-Setting Model of L2 Acquisition. *Language Learning*, 37: 19-62.

Flynn, S. and I. Espinal. 1985. Head-initial/head-final parameter in adult Chinese L2 acquisition of English. *Second Language Learning*, 1: 93-117.

Hayes, Bruce. 1981. *A Metrical Theory of Stress Rules*. Bloomington, Indiana: Indiana University Linguistics Club.

Hayes, Bruce. 1982. Extrametricality and English Stress. *Linguistic Inquiry*, 13: 227-76.

Mairs, J.L. 1989. Stress assignment in interlanguage phonology: an analysis of the stress system of Spanish speakers learning English. In Susan M. Gass and J. Schachter (eds.), *Linguistic Perspective in Second Language Acquisition*. New York: Cambridge University Press.

Phinney, M. 1987. The Pro-Drop Parameter in Second Language Acquisition. In T. Roeper and E. Williams(eds.), *Parameter Setting* (pp. 221-38). Lancaster: D. Reidel Publishing Company.

White, L. 1987. A Note on Parameters and Second Language Acquisition. In T. Roeper and E. Williams (eds.), *Parameter Setting* (pp. 239-46). Lancaster: D. Reidel Publishing Company.

APPENDIX

Table 1: Example of Regularly-Patterned Results

V3BNB (i.e. 3-syllable verbs with branching rimes in initial and final syllables but non-branching rime in second syllable)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	ante	*penult	*final	ante	*penult	*final
TOIsapaw VV V VV	6	1	0	5	0	0
SIKnabey VC V VV	7	0	0	3	2	0
HYsedect VV V VCC	6	1	0	2	0	0
LEFgenikt VC V VCC	5	1	0	2	1	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 2: Example of Irregularly-Patterned Results

V3BBB (i.e. 3-syllable verbs with branching rimes in all three syllables)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	ante	*penult	*final	ante	*penult	*final
BAWtigpai VV VC VV	3	3	0	2	1	0
DANlaisoy VC VV VV	2	4	0	0	2	0
LOUsapkust VV VC VCC	3	4	0	3	2	0
FELrenhast VC VC VCC	3	5	0	2	2	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 3
Stress Patterns Observed

NUMBER OF SYLLABLES	REGULAR		IRREGULAR	
	VERB	NOUN	NOUN	VERB
TWO	***B*** N ***N*** N	***B*** B ***N*** B ***B*** N ***N*** N		***B*** ***B*** ***N*** ***B***
THREE	N ***B*** N B ***B*** N ***B*** N B ***N*** N B	N ***B*** N B ***B*** N ***B*** N B ***N*** N B		
FOUR		B ***B*** B N ***B*** B ***B*** N N ***N*** N N		***B*** ***B*** B ***N*** ***B*** B ***B*** ***N*** N ***N*** ***N*** N
FIVE		B ***B*** N B B ***B*** N N N ***B*** N B N ***B*** N N B N ***B*** B B N ***B*** N N N ***B*** B N N ***B*** N		
SIX		B ***N*** N B B ***N*** N N N ***N*** N B N ***N*** N N		B ***B*** B B ***B*** N N ***B*** B N ***B*** N

Note: primary stress is indicated by bold face, italicization and underlining

Table 4: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2BB (i.e. 2-syllable verbs with branching rimes in both syllables)

SUBJECTS	UNDERGRADUATE		SECONDARY	
	NO. OF RESPONSES		NO. OF RESPONSES	
STRESS ON	*penult	final	*penult	final
abNAW VC VV	0	7	0	8
bawTEY VV VV	2	5	4	2
poiKAPT VV VCC	5	2	4	1
vipGAND VC VCC	6	1	3	3

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 5: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2NB (i.e. 2-syllable verbs with non-branching rime in initial syllable but branching rime in final syllable)

SUBJECTS	UNDERGRADUATE		SECONDARY	
	NO. OF RESPONSES		NO. OF RESPONSES	
STRESS ON	*penult	final	*penult	final
baGOY V VV	2	3	2	4
teTAY V VV	1	7	2	5
veBUST V VCC	5	2	3	2
gaLISK V VCC	4	3	3	3

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 6: Stress Patterns of 2-Syllable Nouns
(with intended syllable structure preserved)

N2BB (i.e. 2-syllable nouns with branching rimes in both syllables)

SUBJECTS	UNDERGRADUATE		SECONDARY	
	NO. OF RESPONSES		NO. OF RESPONSES	
STRESS ON	penult	*final	penult	*final
TEEwaw VV VV	6	2	5	3
TACboi VV VV	6	2	5	2
MOOtand VV VCC	4	2	5	1
SEKnast VC VCC	6	0	4	1

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

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Table 7: Stress Patterns of 2-Syllable Nouns
(with intended syllable structure preserved)

N2NB (i.e. 2-syllable nouns with non-branching rime in initial syllable but branching rime in final syllable)

SUBJECTS	UNDERGRADUATE		SECONDARY	
	NO. OF RESPONSES		NO. OF RESPONSES	
STRESS ON	penult	*final	penult	*final
MItern V VV	4	2	3	3
LEkɜw V VV	1	4	3	1
FIgict V VCC	6	0	4	0
FImact V VCC	5	2	1	1

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 8: Stress Pattern of 3-syllable Nouns

N3BBN (i.e. 3-syllable nouns with branching rimes in initial two syllables but non-branching rime in final syllable)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	*ante	penult	*final	*ante	penult	*final
tarHARlin VV VV VC	1	7	0	0	5	0
gabSOOma VC VV V	1	7	0	1	5	0
takDEMlit VC VC VC	5	3	0	4	3	0
kawTIPna VC VC V	1	5	0	2	2	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 9: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2BN (i.e. 2-syllable verbs with branching rime in initial syllable and non-branching rime in final syllable)

SUBJECTS	UNDERGRADUATE		SECONDARY	
	NO. OF RESPONSES		NO. OF RESPONSES	
STRESS ON	penult	*final	penult	*final
KOUba VV V	6	0	5	0
ZIPda VC V	7	0	5	0
GUMnit VC VC	7	1	5	0
FOOseg VV VC	5	1	5	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 10: Stress Patterns of 2-Syllable Verbs
(with intended syllable structure preserved)

V2NN (i.e. 2-syllable verbs with non-branching rime in both syllables)

SUBJECTS	UNDERGRADUATE		SECONDARY	
	NO. OF RESPONSES		NO. OF RESPONSES	
STRESS ON	penult	*final	penult	*final
HAca V V	2	0	1	0
GEfa V V	6	0	2	0
MAlan V VC	3	2	5	1
VEkan V VC	4	0	3	4

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 11: Stress Pattern of 3-syllable Verbs

V3BBN (i.e. 3-syllable verbs with branching rimes in initial two syllables but non-branching rime in final syllable)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	*ante	penult	*final	*ante	penult	*final
poiVEYtik VV VV VC	1	5	0	0	3	0
imPEKtet VC VC VC	1	6	0	1	3	0
terNETma VV VC V	2	4	0	0	4	0
zanPARha VC VV V	1	2	0	0	2	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 12: Stress Pattern of 3-syllable Verbs

V3NBN (i.e. 3-syllable verbs with non-branching rimes in initial and final syllables but branching rime in second syllable)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	*ante	penult	*final	*ante	penult	*final
seTAIba V VV V	1	5	0	0	1	0
gaTILda V VC V	1	7	0	0	2	0
maTAMren V VC VC	2	5	0	1	3	0
teGARwin V VC VC	0	6	0	0	0	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 13: Stress Pattern of 3-syllable Verbs

V3BBB (i.e. 3-syllable verbs with branching rimes in all three syllables)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	ante	*penult	*final	ante	*penult	*final
BAWtigpai VV VC VV	3	3	0	2	1	0
DANlaisoy VC VV VV	2	4	0	0	2	0
LOUsapkust VV VC VCC	3	4	0	3	2	0
FELrenhast VC VC VCC	3	5	0	2	2	1

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 14: Stress Pattern of 3-syllable Verbs

V3BNB (i.e. 3-syllable verbs with branching rimes in initial and final syllables but non-branching in second syllable)

SUBJECTS	UNDERGRADUATE			SECONDARY		
	NO. OF RESPONSES			NO. OF RESPONSES		
STRESS ON	ante	*penult	*final	ante	*penult	*final
TOIsapaw VV V VV	6	1	0	5	0	0
SIKnabey VC V VV	7	0	0	3	2	0
HYsedect VV V VCC	6	1	0	2	0	0
LEFgenikt VC V VCC	5	1	0	2	1	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Table 15: Stress Pattern of 4-syllable Nouns

N4BNBB (i.e. 4-syllable nouns with branching rimes in initial and final two syllables but non-branching in second syllable)

SUBJECTS	UNDERGRADUATE				SECONDARY			
	O. OF RESPONSES				NO. OF RESPONSES			
STRESS ON	*pre	*ant	pen	*fin	*pre	*ant	pen	*fin
leesiKATpai VV V VC VV	0	2	4	0	0	0	0	0
filwaZAWdai VC V VV VV	0	0	3	0	0	0	4	0
dailiGATnust VV V VC VCC	0	2	3	0	1	1	0	0
makgaTAWpect VC V VV VCC	0	0	3	0	0	0	0	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Key: pre=pre-antepenultimate
ant=antepenultimate
pen=penultimate
fin=final

Table 16: Stress Pattern of 4-syllable Nouns

N4BNBN (i.e. 4-syllable nouns with branching rimes in initial and third syllables but non-branching rimes in second fourth syllables)

SUBJECTS	UNDERGRADUATE				SECONDARY			
	O. OF RESPONSES				NO. OF RESPONSES			
STRESS ON	*pre	*ant	pen	*fin	*pre	*ant	pen	*fin
kaitiPOOsin VV V VV VC	0	1	5	0	1	0	4	0
migkaSEYta VC V VV V	0	0	2	0	0	0	1	0
fawbeLEKna VV V VC V	0	2	2	0	0	0	0	0
netgiSAPnis VC V VC VC	0	1	4	0	0	0	2	0

* Not rule-predicted

NB Capitalization indicates rule-predicted primary stress

Key: pre=pre-antepenultimate
ant=antepenultimate
pen=penultimate
fin=final

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Relative Complexity: Beyond Avoidance[1]

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Introduction

This paper brings together two influential contributions to the literature on relative clauses (henceforth RCs): Schachter (1974) and Keenan & Comrie (1977). It addresses the development of relative clauses in the interlanguage of advanced Chinese ESL speakers in light of Keenan & Comrie's Accessibility Hierarchy (AH). As the two theories predict, we typically find avoidance of RCs with oblique and genitive rather than with objects or subjects RCs. Error types are similar to those found for learners of other first language backgrounds: the use of Resumptive Pronouns in Genitive RCs, at the bottom of the hierarchy, is of particular interest. To explain these findings, we outline a processing motivation hypothesized to underlie the AH and its reflexes in interlanguage.

Relatives in Chinese and Interlanguage

Although the development of RCs has been investigated for several second language contexts, the case of Chinese learners of English is particularly interesting in that the L1 relative clauses are typologically different from those in English, as illustrated from Mandarin in (1).

(1a) Xihuan wo de ren (subject relative clause)
like me REL person
'The person/people who like me.'

(1b) Wo xihuan de ren (object relative clause)
I like REL person
'The person/people who I like.'

The word order in Chinese is the reverse of the English: the head noun comes at the end of the relative clause, so the structure is left-branching. The relative marker is the invariant de (ge in Cantonese, where the RC structure is similar) which is not unique to RCs but occurs in various structures of prenominal modification. Consequently, knowledge of the Chinese structure cannot readily be transferred in

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[1] An earlier version of this paper was presented at the Conference on Second Language Acquisition in the Chinese Context, CUHK, July 1991. We are grateful for comments from the conference participants, in particular Lydia White, Vivian Cook and Rod Ellis.

constructing an English RC. In this situation, we can expect universals of interlanguage structure to be manifested in the development of English relatives in Chinese speakers, and vice versa.

The Noun Phrase Accessibility Hierarchy

A productive paradigm of research on relative clauses has been inspired by the Noun Phrase Accessibility Hierarchy, proposed by Keenan and Comrie (1977). The AH is a generalization about relative clauses across languages. It essentially states that the ease with which relative clauses may be formed follows a hierarchy of grammatical relations, as in (2):

(2) SUBJECT > D.O.> I.O.> OBLIQUE > GENITIVE > OCOMP[2]

That is, subjects are more "accessible" to relative clause formation than direct objects which are more accessible than indirect objects, and so on. This entails that if a language allows relativization with one grammatical relation, it must allow it with all the relations higher up on the hierarchy. Languages differ substantially in how far down the hierarchy they permit relativization.

These predictions have stood up well across languages. We are concerned here with the idea that the interlanguages of second language learners are also subject to the Accessibility Hierarchy, and that it represents a hierarchy of difficulty in second language acquisition of relative clauses.

Avoidance of Relative Clauses

The study of relatives in interlanguage was pioneered by Jacquelyn Schachter in her classic paper, "An Error in Error Analysis" (1974). The paper argued

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[2] The Object of Comparison (OComp) is included for the sake of completeness only. Rod Ellis (p.c.) has observed that such structures as (i-ii) below are exceedingly rare and therefore not testable in terms of production data.

(i) the farm that theirs is bigger than
(ii) the farm than which theirs is bigger

Moreover, Vivian Cook has found that native speakers are uncertain of the grammaticality of such relatives.

that the analysis of interlanguage grammar requires much more than recording and explaining errors. Schachter pointed out that considering errors alone does not give a true picture of L2 competence. Her results, as shown in Table 1, might easily give the impression that the Persian and Arabic speakers have the greatest difficulty with relative clauses--they make many more errors than the other groups, while Chinese and Japanese speakers make relatively few.

Table 1: Relative clause production in five language groups (from Schachter 1974:209)

	Correct	Error	Total	% errors
Persian	131	43	174	25
Arab	123	31	154	20
Chinese	**67**	**9**	**76**	**12**
Japanese	**58**	**5**	**63**	**8**
American	173	0	173	-

However, an equally important contrast is in the number of relative clauses attempted: Chinese and Japanese speakers attempted barely half as many as the other groups. Schachter hypothesized that they were avoiding the structure, producing relatives only when they were confident of getting them right. While error patterns alone would suggest that Arabic and Farsi speakers had more difficulty with Relative clauses, once we consider avoidance the picture is quite different. Schachter attributes this effect to first language influence: while Arabic and Farsi speakers can construct an English relative clause based on a similar L1 structure, Chinese speakers cannot. Consequently, they rarely attempt one; and when they do, as we shall see, they make many of the same errors as Arabic speakers.

Together with the Accessibility Hierarchy, Schachter's avoidance hypothesis makes a significant prediction: learners should tend to "avoid" relative clauses lower on the hierarchy more than those higher up. Following the interlanguage hypothesis--the assumption that interlanguages are natural languages--at any developmental stage, a learner's production should respect the hierarchy. Thus, there should be learners who use subject relatives and avoid other types, learners who can manage indirect object but not oblique or genitive RCs, etc.

Naturally, these predictions only follow if other things are equal--in particular, if L1 transfer does not intervene to favour one type of relative over another. For the typological reasons discussed earlier, Chinese learners of English make an appropriate test case here in that the Chinese structure is not readily transferable. First language influence cannot be wholely discounted, however. Chinese forms subject and object RCs, as in (1a-b), much more readily than those lower on the hierarchy. Hsin (1991) identifies first language influence on the production of RCs by Taiwanese ESL students. These subjects produced only subject and object relatives ih free writing.

Our data come from written production of advanced students, English majors at the University of Hong Kong and the Chinese University. Such students can no longer afford to keep on avoiding relatives. They are writing on complex topics such as literary criticism and linguistic analysis, which force the use of relative clauses if they are to write at an appropriate level of sophistication. To see the dilemma facing the advanced student, let us consider a first year essay which shows avoidance and its effect on style. The student in (3) is trying to explain the plot of "Julius Caesar":

(3) Rome is under the military rule of **Caesar. And Caesar's** ambition is more and more obvious...This can be shown by looking at **Caesar's words. In his words,** he shows his contempt...

Although it contains no actual errors, the passage needs relatives to extend the length of sentences beyond a single clause and to achieve cohesion. For a native speaker, not to use relatives here would be quite unnatural, unless it were for some kind of intentional stylistic effect.

Notice next that the Relative Clauses required here are not of the most straightforward kind. The first case requires a genitive Relative Clause--"Caesar, whose ambition"--and the second a locative (oblique) one: "Caesar's words, in which". Moreover, the same essay contains several examples of relative clauses, so it is not simply the case that the student cannot form RCs. Rather, she can readily produce subject relatives, such as these:

(4) Cassius and his conspirators rebel against **Caesar, the one who** will probably become the king of Rome.

(5) Except **Brutus who actually rebels** against Caesar for the common good,...

Given the free production of subject relatives and avoidance of others, it seems plausible to suppose that the restriction of Relative Clauses to subjects in such learners is not merely the effect of input frequency. Rather, the target structures involving genitive and locative RCs, as required in example (3), are being avoided, as Schachter suggested. It is worth asking exactly what this means in terms of grammatical knowledge. Firstly, it is presumably a question of production rather than comprehension: we take it to mean that the learner's grammar does not allow the target structure to be spontaneously generated. Secondly, the knowledge that is missing is tacit or "acquired" knowledge; in other words, "avoidance" is primarily unconscious.[1] If we were to spoon-feed the same student with a sentence-combining task, she would no doubt be able to produce the target structure, with the aid of conscious effort.

Error Patterns

Further evidence that the learner's grammar does not generate the target structures comes from the errors that occur. When more complex RCs are attempted, we find various interlanguage developmental structures. The error types we have found are very much like those which have been observed in other L2 contexts, suggesting that universals of interlanguage syntax are at work here.

One basic error is to simply ignore the grammatical relation involved, by using <u>that</u> as a generic relative marker, as in (6) and (7):

(6) There are also **cases that boys are naughty** and they pretend to be girls.

(7) It is really a contriversial issue **that nobody can find a definite answer.**

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[1] It seems likely that some learners also avoid such complex structures consciously, with the same effect on production.

We also find which-relatives with a missing preposition (as in 8):

(8) Base is defined as the word **which affix can be added.**

The difficulty here involves the acquisition of Pied-Piping (moving the preposition along with the relative pronoun, as in *to which affixes can be added*) and Preposition Stranding (leaving the preposition behind, as in *which affixes can be added to*). Both of these options are unknown in Chinese; the choice between them is primarily a stylistic one in English. Confusion with these options is clear from examples such as (9) which has both Pied-Piping and Preposition Stranding:

(9) Stem is the element **to which the inflectional affixes add to.**

Particularly interesting in terms of the AH is the use of resumptive pronouns as in (10) and (11):

(10) 'Go in for' is a phrasal verb **which the meaning of it** is very different from the literal meaning.
(11) There are thousands of crimes **of which** think and sex are two **of them**.
(12) They wanted to build a tower **which its top** can reach the heaven.

These error types appear to be universal features of interlanguage. Tarallo & Myhill (1983) found them all when they studied English speakers learning various languages, including Chinese. Surprisingly, English learners of Chinese produce resumptive pronouns, even though they are almost unknown in English.

In our data, the only clear cases of resumptive pronouns involve genitive relatives, as in (10-12). This accords with Keenan & Comrie's cross-linguistic finding that languages begin to use resumptive pronouns at the lower end of the hierarchy. Keenan (1988:37) has hypothesized an explanation for this distribution: resumptive pronouns facilitate processing of a relative clause because they allow the logical structure of a full clause to be retained. This obviates the need to reconstruct the relation beween the antecedent and the trace of wh-movement.

Another interesting error is the type in (13-14):

(13) At the levels of phonetics and phonology, the use of alliteration, parallelism and rhythm is quite common. **The use of which** is regularly found in the headlines...

(14) There are listing devices in news reporting. By **the use of which**, the report will become more impressive and memorable.

This use of relatives like these, with the antecedent outside the sentence, is quite grammatical in some languages such as Latin, where they are known as "connecting relatives". Apparently the student has acquired the knowledge that relatives create cohesion, without the constraint that the antecedent must be within the sentence.[4]

The AH and Interlanguage Development

Several studies have applied the predictions of the AH to second language acquisition (see Gass 1979; Gass & Ard 1984; Tarallo & Myhill 1983). The Hierarchy was developed within what has come to be known as the typological approach to Universal Grammar; that is, the claim of universality is based on a large sample of languages in which the principle applies. It takes the form of an **implicational universal**: the presence of property P in a language implies the presence of property Q. Specifically, a relative construction which applies to a given point on the hierarchy of grammatical relations must apply at all higher points.

Let us examine exactly what predictions follow for acquisition. John Hawkins (1987), developing an insight of Jakobson's, has made the developmental predictions of implicational universals such as the Accessibility Hierarchy very precise. Note that it is <u>not</u> predicted that the relatives should be acquired in the order of the hierarchy, because two or more types could be acquired simultaneously and the universal would still be satisfied. The prediction is this: at no stage will an interlanguage grammar permit relativisation of grammatical relations lower on the hierarchy while not permitting it on higher positions. That is, if an English learner can produce a relative

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[4] An alternative possibility is that the students have acquired this structure from older English literature in which it occurs. If so, there is a warning here about the effects of such literature as linguistic input.

clause on an indirect object, she can also produce one with a subject or direct object. Conversely, we should find learners who produce subject but not object relatives, or indirect object but not genitive ones. These predictions cannot be tested from production data alone. Gass & Ard (1984) tested for avoidance using a sentence combining task, in which subjects avoided relatives more the lower they came on the hierarchy. Conversely, the higher the structure on the hierarchy, the more accurately it was produced. These findings, then, were consistent with the Hierarchy's interlanguage predictions overall. There was one systematic exception: genitive Relative Clauses are avoided less than oblique ones. Gass & Ard attribute this to the complementizer "whose" which makes a genitive Relative Clause simpler then one involving a preposition. This would be an example of a language-specific property which skews the effect of the hierarchy.[5]

While it is widely accepted that there is a gradient of difficulty roughly corresponding to the Accessibility Hierarchy, the explanation for these findings has been more controversial. Sceptics have pointed out that they may just be a reflex of input frequency--subject relatives are much the most common, object relatives the next most frequent and so on.[6] While this is hard to discount as an explanation, students such as our subjects receive ample input with

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[5] As Rod Ellis has pointed out, the position of the Genitive on the hierarchy is complicated by the fact that the genitive relative pronoun may itself be a subject, object or oblique argument of the RC:

(i) The child whose portrait delighted her
(ii) The child whose portrait she admired
(iii) The child with whose portrait she was pleased

Consequently, there is a hierarchy of grammatical relations within the Genitive, which may overlap with the AH itself. If not controlled for, this variable can be expected to produce "noise" in RC data.

[6] This is clearly the case, as shown by textual data in Keenan (1988). Keenan sees this as evidence that the AH is operative in on-line production (perfomance) as well as being part of grammatical knowledge (competence). A similar view of the relationship between competence and performance is developed in Hawkins (forthcoming).

prepositional relatives. If all relatives were equally easy we should not find the asymmetries that we do.

Roger Hawkins (1989) also questions the relevance of the AH to IL development, but for different reasons. Studying English learners of French, he argues that learners do not make use of configurational information involving the grammatical relation of the head to the relative clause, as the AH implies. Instead, they use construction-specific information, such as the morphology of the relative marker. One problem with Hawkins' study is that the relativization strategies in French and English are, at least by typological standards, very similar. They are both head-initial and use pied-piping for oblique relatives. For English speakers, acquiring French relatives entails only details of morphology and movement. Consequently, the role of transfer may obscure any universal tendencies. In Chinese learners, by contrast, there is little basis for positive transfer. In particular, the options of Pied Piping and Preposition Stranding under movement are unknown in Chinese. As a result, Chinese speakers fall back on universal options such as resumptive pronouns.[7]

Processing and the AH

R. Hawkins (1989) acknowledges the evidence for accessibility effects in interlanguage. He attributes these findings to processing difficulty, following a proposal by Tarallo and Myhill (1983) who suggested that the difficulty of relatives was proportional to the distance between the antecedent and the trace. That is, in a subject relative the relative pronoun is immediately adjacent to the subject trace; in an

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[7] Resumptive Pronouns (RPs) are marginally possible in some varieties of Chinese, for example in the following Mandarin indirect object relative:

Wo gei **ta** shu de neige pengyou
I give **him** book RC that friend
"The friend that I gave a book to"

This option could contribute to the use of RPs in the English of Chinese speakers. Note, however, that such an effect is much less plausible as an explanation of Tarallo & Myhill's finding that English learners of Chinese adopt RPs. Gass (1979:337) notes that where RPs occur in the L1, it is not possible to distinguish L1 influence and universals in the use of RPs.

object relative, separated from its trace by the verb; and so on:

Subject: the house which _ belonged to her

Object: the house which she liked _

Oblique: the house which she lived in _

Genitive: the house which she liked the style of _

This increasing distance between antecedent and trace produces a gradient of processing difficulty which matches that of the AH. A priori, this looks like a case of the opposition between Universal Grammar and processing explanations, which has become a prominent issue in recent SLA research.[x] Roger Hawkins' rejection of the Hierarchy as an explanation might seem to be a case of this: a processing account obviates the need for specific universal principles governing relative clauses, at least in interlanguage. However, a parallel development is the rise of processing accounts of grammatical phenomena. In these accounts, the properties of grammatical universals are themselves attributed to processing factors. John Hawkins has proposed several such explanations and in recent, forthcoming work, he has also proposed such an explanation for the Accessibility Hierarchy.

John Hawkins argues as follows. A subject relative is simpler overall than an object relative. The reason is that a subject relative might only involve an intransitive predicate, whereas an object relative entails a transitive clause. Similarly, indirect, locative objects and so on are increasingly complex: a dative relative has either a ditransitive predicate or a prepositional phrase, either of which is more complex than a clause containing one or two NP arguments. The other relations (in English, at least) all require prepositional phrases and often pied-

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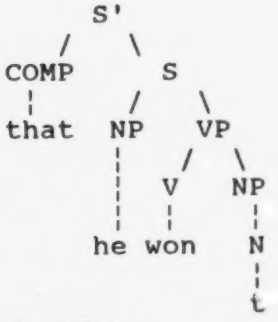
[x] Schachter (1989) and Schachter & Yip (1990) have proposed processing explanations for judgmental findings on extraposition and wh-movement respectively. They suggest that many second language studies in which UG effects have been identified may be open to the same kind of revision.

piping. Genitive relatives involve embedding inside a noun phrase, and often a prepositional structure too. The gradual increase in complexity may be seen by comparing the respective constituent structures:

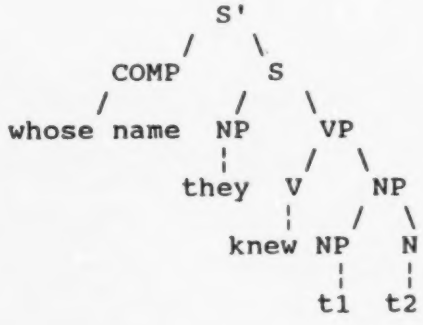
```
Subject:    The player [who [ _ won] ]
                           S
Object:     The match [that [he won [_] ] ]
                            S      NP
Dative:  The player [who [they gave [_] [the award] ]]
                         S         NP   NP
Oblique: The player [about whom [they wrote [_] ] ]
                                  S          PP
Genitive: The player [whose name [they knew [ [_] ]]]
                                    S          NP NP
```

This increasing complexity could be measured in various ways. John Hawkins identifies depth of embedding, rather than distance, as the crucial factor and suggests a measure of "syntactic density" which is the number of nodes by which the most deeply embedded node of a structure is dominated or c-commanded.[9] The sample structures below show that the trace of wh-movement in the genitive structure is considerably more deeply embedded than that in the object relative:

Object:



Genitive:



Number of nodes dominating or c-commanding trace:	6	9

However it is measured--in terms of distance as Tarallo & Myhill suggested, or in terms of depth of embedding as in John Hawkins' account--there is a gradient of complexity here. If this is indeed the

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[9] A node *A* is said to dominate another node *B* if *A* is above *B* in the tree structure. *A* is said to c-command *B* if the node immediately above *A* dominates *B*.

explanatory basis for the AH, then we can accept Roger Hawkins' conclusion that processing considerations are crucial in the development of relative clauses without rejecting the relevance of the AH. Rather, the AH is itself motivated by considerations of processing, with reflexes in both cross-linguistic distribution and interlanguage.

Conclusions

The production of English relative clauses by Hong Kong learners bears out the predictions made by Schachter's avoidance hypothesis in conjunction with the NP Accessibility Hierarchy. The interlanguage of these students continues to avoid relatives up to quite an advanced level of competence, especially at the lower end of the Hierarchy. When they do attempt the more complex relatives, they produce similar error types to other second language learners. In particular, they produce Resumptive Pronouns in Genitive RCs, at the bottom of the hierarchy. The remarkable similarity here between learners of different L1 backgrounds suggests that universal factors outweigh transfer in this area.

On the explanatory side, we have suggested that the hierarchy of complexity presented by Relative Clauses is ultimately one of processing difficulty, which has reflexes in interlanguage development as well as in distribution across languages. The relevant notion of complexity may be measured in terms of the overall depth of embedding of the RC structure. The introduction of resumptive pronouns in genitive RCs, at the bottom end of the hierarchy, can be seen as a universal strategy which interlanguages, like other natural languages, adopt in response to this difficulty.

References

Gass, S. 1979. Language transfer and universal grammatical relations. *Language Learning* 29/2: 327-44.

Gass, S. & J.Ard. 1984. The ontology of language universals. Rutherford, W. (ed): *Language Universals and Second Language Acquisition*. Amsterdam: John Benjamins.

Hawkins, J.A. 1987. Implicational universals as predictors of language acquisition. *Linguistics* 25: 453-473.

Hawkins, J.A. forthcoming. *A Performance Theory of Order and Constituency*. Cambridge University Press.
Hawkins, R. 1989. Do second language learners acquire restrictive relative clauses on the basis of relational or configurational information? *Second Language Research* 5: 156-88.
Hsin, A.L. 1991. Some Observations on the Constraints of Chinese Relativization. Paper presented at the Conference on Second Language Acquisition in the Chinese Context, CUHK, July 1991.
Keenan, E.L. 1988. *Universal Grammar: 15 Essays*. London: Croom Helm.
Keenan, E.L. & B. Comrie. 1977. Noun phrase accessibility and universal grammar. *Linguistic Inquiry* 1: 63-99.
Schachter, J. 1974. An error in error analysis. *Language Learning* 24: 205-214.
Schachter, J. 1989 A new look at an old classic. *Second Language Research* 5, 30-42.
Schachter, J & V. Yip. 1990. Why does anyone object to subject extraction? *Studies in Second Language Acquisition* 12: 379-392.
Tarallo, F, & J.Myhill. 1983. Interference and natural language processing in second language acquisition. *Language Learning* 33: 55-76.

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THE INTERPRETATION OF LINGUISTIC SIGNS AND THE ROLE OF INFERENCE

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1. Language Use

1.1 Language is used to say something

Although it may seem too elementary a thing to say that language is used to say something, it is apparently not so understood by most linguists and speakers in general. With regard to everything else we are ready to admit that if we use something to do something else, then this "something" does not go into the "something else" and must not be included in it as a part or a component. We use a camera to take a photo, the art of drawing to produce images of real things, arithmetic to settle accounts, and so on and so forth. In all these cases, the former (camera, art of drawing, and arithmetic) are instrumental to the creation of the latter (photographs, images, and accounts), but do not go into them to form a part. In this sense, using something to do something else is different from using something to make something. When we use wood to make a table, the wood goes into the table, and consequently, theoretically speaking, there is so much wood less, as wood, in this world. When we make a statue with wax, the same thing happens. But language does not diminish with use, so language use belongs to the category of using something to **do** something else.

Besides, there is no difficulty in seeing that a photo of a person is not the person himself. A drawing of a table is likewise not the table. By inference, the thing we say is not the thing we say about.

Yet with language the differentiation of the tool from the artefact, and the differentiation of the thing we say from the thing we say about are difficult to make--because the tool (language) is not anywhere to be found outside of the artefacts (utterances); and very often the thing we say about (as in the case of ideas) is not to be found outside of what we say (again utterances). So naturally utterances are easily

taken to be language.

But utterances are not language, just as a picture is not the art of drawing and a bank account is not arithmetic. The latter are behind, under or in the former, and one can deduce the latter from the former, but the two are not identical. So far I have been arguing that language is a tool in the sense that it provides the basic operators and rules of operation for speech as arithmetic does for calculation. This tool has no natural form of expression except in its products--utterances, but we have long since deduced it from its products and outlined it in various grammars and dictionaries. Further, theorizing about the nature of language, linguists since Saussure have followed the concensus that it represents a system of signs, each of which is a combination of a signal, serving as its form, and a meaning, serving as its content.

The inference linguists have failed to make is: since meaning is inherent in the linguistic system, and this system is, as we have discussed above, instrumental to the production of utterances but does not go into them as a component part, it follows that system meaning must be differentiated from utterance meaning. In using language, we are taking advantage of something which has its own meaning to **indicate** the meaning we want to express.

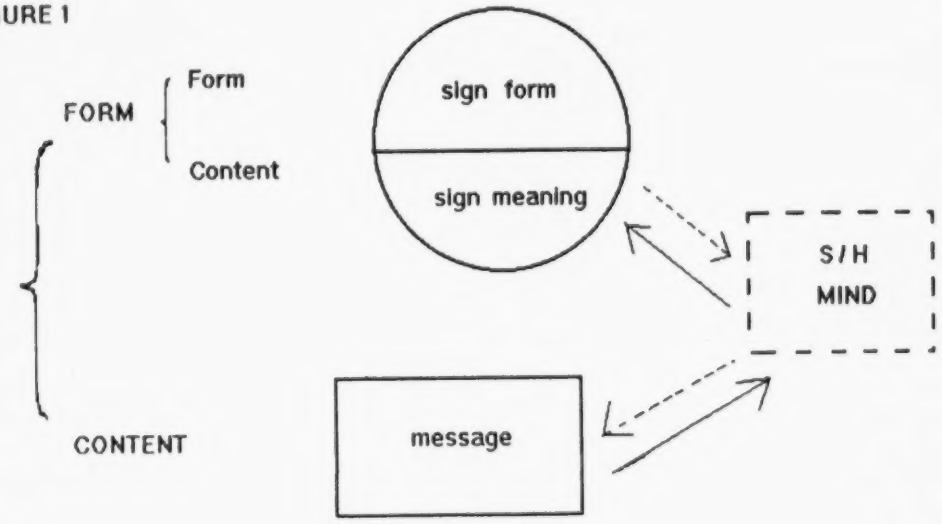
Since language is a tool that is restricted in its expressive potential by the linguistic system, speakers often have to rely on inferences made on the basis of the meaning of sentences to get at the messages conveyed, and learn to take advantage of this process to carry on communication. "What time is it?" is an explicit and straightforward question. But it seems that people are not entirely comfortable with its straightforwardness. Therefore, what one often hears on a casual occasion is "Have you got the time?" or simply "Got the time?" The meaning of the sentence can only be: "Have you got a watch so that you may know the time?" But we know by inference that the person is not interested in knowing if we have the time, but in knowing the time himself. This is not the meaning of the sentence, but it is the message it carries. Apparently, this oblique form of inquiry is preferred because it sounds less imposing: one would feel freer to say "No", since the question is simply whether we have the time, while the request for help is our own inference.

Once inference is understood as a regular component in language use--both in encoding and decoding a message--it follows that conversational implicatures and indirect illocutionary forces become special cases of this general process. Further, as will be demonstrated in Section 3 of this paper, the inferential processes at the various levels of language use all follow the general Gricean pattern of "what is said is p, but what is meant is q".

1.2 The Model of Saying Things

What all the above is driving at is that there are **two** combinations of form and content at two different levels. Language represents one combination of form and content, defined by Saussure as the combination of the signifiant and signifié (for our purpose we will call them sign form and sign meaning respectively). When language is put to use, this systematic combination of form and content in turn becomes the **form** of a speech event (hence the formulation "language is form"), which is meant by the speaker and understood by the hearer to indicate, to hint at, the **content** of the speech event (the things we want to say, which from now on will be referred to as the message), thus forming another form-content combination. This dual relationship can be shown as follows:

FIGURE 1



(The straight-line arrows indicate the language use process of the hearer: the dotted line arrows that of the speaker.)

The processes indicated in FIGURE I are activated not only when there is some kind of indirect meaning or message to be worked out, as one may tend to think, but are constantly at work in language use. The inferential processes have to be there, if language is thought of as a system with its meaning used to carry messages. Even when a sentence is used in its literal meaning, i.e. when meaning and message coincide, we still need the inferential processes to turn the meaning, which is a potential of the linguistic system, into a message, which is something that is really conveyed in communication, and to reveal that the two actually agree. A sentence like:

(1) Shakespeare was a great playwright.

is said to be used in its literal meaning because every sign meaning in it is turned directly, without any change, into a corresponding sign message, and when the sentence message, resulting from all the sign messages, enter's the hearer's mind to be processed, the final discourse message remains the same. However, this is not always the case. If the same sentence (1) is said in a context where the interest is concentrated on Shakespeare's qualities as a philosopher, then the sentence message of (1) is still "Shakespeare was a great playwright" because no change is brought about by the mind in the sign messages (in everyday terms: every word is used in its literal meaning), but after processing the sentence message, the mind may produce as discourse message something like "That Shakespeare was a great playwright doesn't necessarily mean he was a great philosopher" or "Since everybody acknowledges Shakespeare as a great playwright, that already implies that he was not a great philosopher". Even a factual sentence like

(2) Shakespeare was born in 1564.

may in a suitable context carry the message of "He was not to be blamed for not knowing something", which is also produced by the mind after processing the sentence message.

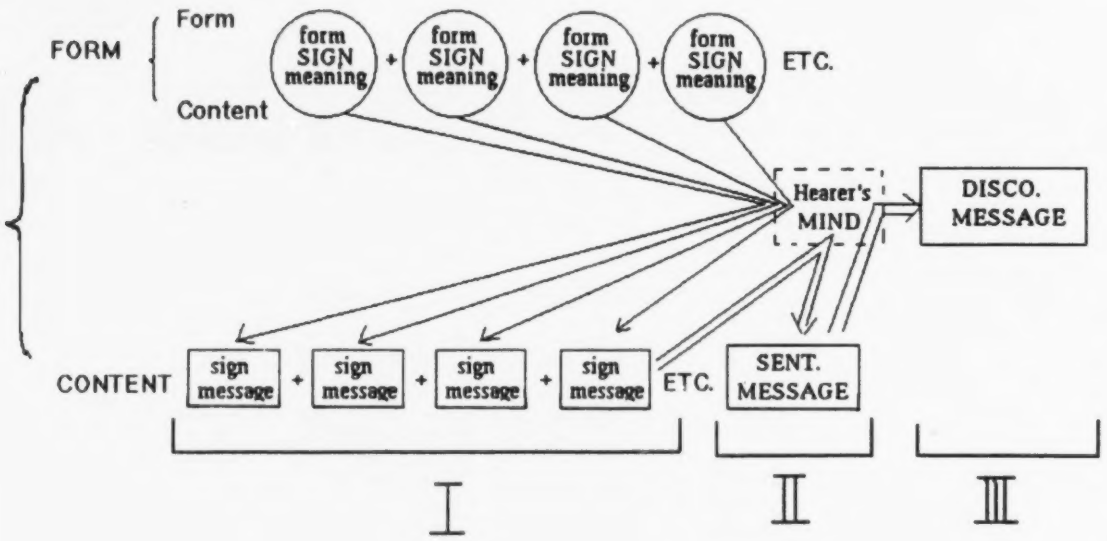
From this angle, the seemingly unexpected message of (3), said in reference to William Gladstone (Allan 1986):

(3) The prime minister is an old woman.

is not difficult to infer, because after the hearer has processed the term the prime minister and concluded that the referent (William Gladstone) is a man, he refuses to take an old woman as a noun modified by an adjective, but goes on recursively to include old woman in one sign and succeeds in obtaining a sign message: "a person who complains too much and cares for trivial things". Then the sentence message of "William Gladstone is a person who complains too much and cares for trivial things" goes through the mind and emerges unchanged as the discourse message.

On the basis of the analysis of these sentences we can draw another diagram (FIGURE 2), which is a more detailed version of FIGURE 1, including the inferential processes at the levels both of single signs and of a whole sentence. For the sake of simplicity, we now take the hearer's point of view, presuming that in order to understand the speaker's encoding process, we have only to reverse the direction of the arrows.

FIGURE 2



If we divide the whole process of understanding an utterance into 3 stages of sign message assignment (I in FIGURE 2), sentence message assignment (II) and discourse message assignment (III), then sentences (1) and (2) in their literal meaning are interpreted already at I, passing through II and III unchanged. When (1) is used to carry the message that Shakespeare was not a great philosopher and (2) that Shakespeare may be excused for not knowing something, they are interpreted in their literal meanings at I, then pass II without any change, because as individual sentences they make good sense. But at III, (1) and (2) in this interpretation would seem irrelevant and therefore they are reinterpreted in accordance with the Cooperative Principle, and discourse messages are inferred for them. A literal interpretation of (3), however, is blocked at II by the clash between the male subject and female predicate. It is sent back therefore and goes through I once again with old woman treated as one sign, the resultant interpretation goes through II and III unchanged.

From the above analysis we can see that the understanding of an utterance, generally speaking, has to go through the 3 stages of I, II and III, and that II serves as a check on the results of I. In the following I will discuss the interpretative process from I through II, leaving III largely undiscussed.

2.0 The Interpretation of Sign Meaning

We do not always have a one-to-one relationship between sign form and sign meaning because of homonymy (see 2.1). So sign meaning has to be interpreted, as a result of which we get a sign message.

2.1 The Interpretation of Grammatical Signs

The realization that the signifié of a word is determined by the linguistic system rather than by preexistent ideas is a major contribution of structuralist linguistics. But when we give the systematic nature of language too narrow an explanation and demand that one and the same signifiant must signify only one signifié, we find ourselves in great difficulty. What kind of general signifié can we give to light (not dark) and light (not heavy), flat (busted tire) and flat (apartment), march and March, sun and air and

son and heir?

In other words, the theory leads us to think that there should not be homonyms, and yet homonymy abounds. In Latin inflectional endings, we have -ae meaning genitive and dative singular and nominative plural ; -i meaning genitive singular and nominative plural; and -o meaning dative and ablative singular in the first declension; -is meaning dative and ablative plural in the first and second declensions; etc. Among modern languages, very much the same is true of the Russian inflectional endings. In English, the /-s/ ending, attached to nouns and realizable as [-s], [-z], [-iz], has two different meanings: "plural" and "possessive".

Looking at the actual use of language, one has to admit that homonymy is not incompatible with the systematic nature of language. This is because language is used by human beings, who are constantly exercising their intelligence vis-à-vis the outside world. Homonymy results when one and the same form participates in different systems or in different specificity levels of the same system, or when a form is assigned a temporary, pragmatic, system. Human beings overcome the difficulty created by homonymy by differentiating linguistic systems, specificity levels and pragmatic systems. This is where the mind comes in.

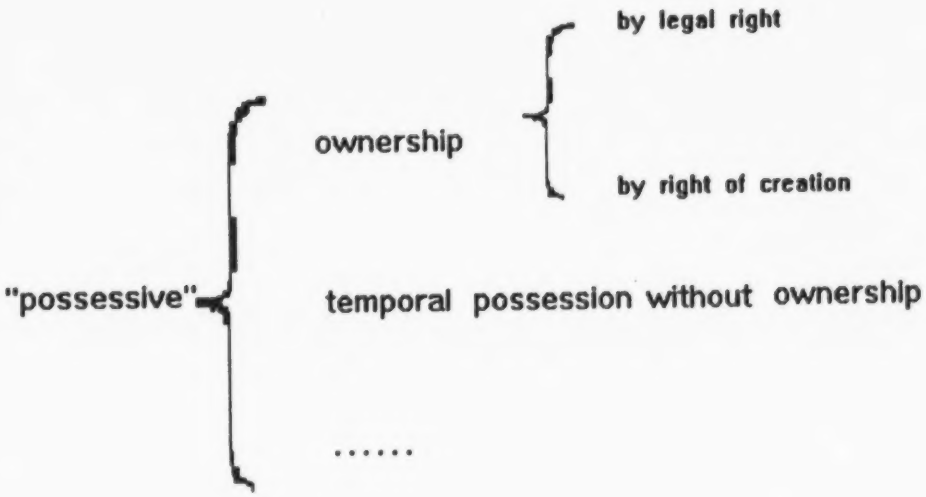
Jakobson (1949) approached this problem on the phonological level when he discussed "overlapping phonemes":

> In Danish this opposition strong/ weak is implemented, for example, by t vs. d in strong position, and d vs. ∅ in weak position, so that the weak phoneme in the strong position materially coincides with the strong phoneme in the weak position...if one should measure the sound matter without reference to the rule of dichotomy imposed upon it by language, the conclusion would be that there are "overlapping" phonemes, in the same way, as a physicist with his acoustic instruments, according to H. Frei's felicitous comparison, fails to explain why, in a given piece of music, F-flat and E represent two different values.

In grammar, it is often not difficult to differentiate the relevant systems. For example, by relying on the Ø/-s opposition in nouns we recognize the number system, by the same Ø/-s opposition in verbs we recognize the person system of present tense verbs, and by the Ø/-s (which is interchangeable with of NP) we recognize the case system in nouns. As a result of the distinction of these three systems, we disambiguate the three -s's, and arrive at the sign message carried by -s in a given context.

Movement along the specificity scale in grammar is also a common phenomenon. For example, the meaning "possessive" as expressed by /-s/ is a general concept which may be presented as a hierarchical structure, as shown in FIGURE 3.

FIGURE 3



The general concept "possessive" is not only required by the theory to match the signifiant /-s/, but also for the interpretation of the sign meaning at the lowest level of specificity. In a sentence like:

(4) The police have banned the suspect's things.

the general possessive meaning is applicable rather than any or all of the specific possessive meanings listed in FIGURE 3, because some of the

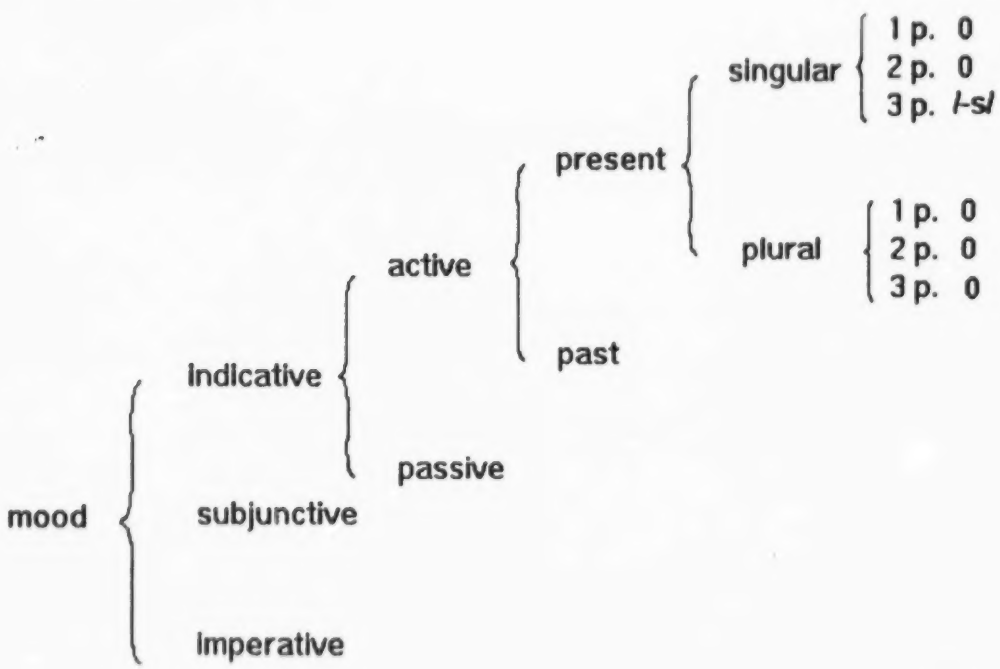
forms of possession may not be implied (e.g. the suspect may not have created anything), while some other forms of possession not enumerated in FIGURE 3, e.g. possession of stolen things, may be implied. However, consider a sentence like (5):

(5) Each of the painter's works was worth a fortune already in his life time, but he died in poverty.

In this case, the general concept of possession is not applicable, so /-s/ has to be interpreted at the higher specificity level of "ownership by right of creation".

The inflectional endings of finite verbs are traditionally said to carry a whole series of meanings. The pair /-s/ and ∅, for example, shares the meanings: "indicative, active, present", then repectively /-s/ implies third person singular subject, and ∅ first or second person singular and all three persons in the plural. These meanings are hierarchical as can be seen in the following diagram:

FIGURE 4



It is difficult to imagine a signifié in which all these meanings are combined together. However, presumably in a pair of sentences such as:

(6) God be blessed. Here comes the man.

most of the oppositions (indicative vs. subjunctive, active vs. passive, third person verb form vs. non-differentiated person verb form) would be activated by the verb forms of be -ed and -s. But often only one of these oppositions is activated in actual language use. In the sentence:

(7) His father worked in a bank.

only the tense opposition (past vs. present) is activated. That is why, hearing such a sentence, one would tend to ask: "Where is he now?" or even "Is he dead?" In the sentence:

(8) I said he comes everyday, not he should come everyday.

the opposition activated is indicative vs. subjunctive.

The actually activated sign meaning, then, represents the sign message that the hearer obtains through the processing of the sign using intelligence.

2.2 Lexical Systems

The complexities of meaning relationships in the lexicon have deterred linguists from talking about lexical systems. However, if we do not expect lexical systems to present an exhaustive list of one-to-one form-meaning combinations, but are prepared to find systems which intersect with each other, move along the specificity scale and may be realized as ad hoc pragmatic systems, as we find in grammar, then we can see that lexical systems share the same characteristics as grammatical systems, showing only much greater flexibility.

A good example of how lexical meaning is assigned by the system is provided by better. Instead of "gooder" or "more good", as the comparative form of good is supposed to mean, the actual meaning is very often "less bad": The patient is better, but still seriously ill; The

situation has become better, but still very dangerous. Although this may be usual for other European languages too, the two meanings are differentiated in Chinese: gen hao for "gooder", but hao xie for "less bad":

(9) bing ren hao xie le buguo
sick person good some PERF but

yijiu bing de hen zhong.
still sick PRT very heavy
"The patient is better, but still seriously ill."

(9a) * bing ren gen hao le buguo
sick person better PERF but

yijiu bing de hen zhong.
still sick PRT very heavy

It is therefore reasonable to suggest that the meaning of better is not "gooder", but "in an improved state", i.e. it forms an opposition in the direction of improvement with some state already referred to. Then worse would mean an opposition with a certain state in the direction of deterioration. Therefore, the weather can be said to have become better no matter whether it is warmer or colder, dryer or wetter. It can also be said to have become worse in the same atmospheric conditions. The opposition is between a state and an altered state which is thought to be an improvement in the case of better, and a deterioration in the case of worse.

As meanings are determined by systems rather than actual physical qualities or relations, a sign form acquires multiple meanings when it takes part in forming oppositions in more than one system. From this angle, it is not difficult to understand the multiple meanings of light, for example. When it forms an opposition with heavy, a system is formed in which we have a binary division of the semantic field of weight, and light means "the opposite of heavy". Likewise, when the opposition is formed with dark, light means "the opposite of dark".

The systematic nature of lexical meaning, however, will be best shown if two identical words form or participate in forming different oppositions based on the same kind of relationship. In such a case, we can attribute

the difference in meaning to nothing other than the systems, i.e. the oppositions in relational, not material terms. We have a good example in black and white. First, there is a system of relative meaning consisting of the opposition of these two terms: a binary division of a semantic field of color. Thus, coffee is said to be either black or white while actually it can only be different shades of brown. For the same reason--that in this system only a binary division is permitted-- day is always said to be white in Chinese, night is black probably in all languages, but when there is need to talk about a night that is not that black, as in Leningrad in summer, one is left with the only alternative: a white night. On the other hand, black and white can certainly denote actual, "physical" colors. In this case, they form a different, quite separate, system with other names for colors, such as red, orange, yellow, green, blue, etc.

With names for concrete things, the specificity levels of a system are of paramount importance. When we talk about streets full of cars, we are on the level of means of transportation in a city. The system concerned is mainly an opposition between cars and pedestrians. When we say a typical American family would own a car and a wagon, we are on a level of higher specificity, using a system in which car is opposed to wagon, limousine, bus, etc. When my remark you've got a nice car evokes the response Yeah, it's a pretty good pick-up, I am being reminded of the need to shift to a level of higher specificity. The word book is used in its low specificity meaning in the sentence The room is full of books, where journals, pictorials, etc. are not differentiated from books. When we say Books are on the second floor and journals are on the third floor, a higher specificity meaning of books is evoked, in which journals are not included. Finally, when we say The accountant is busy with his books, the book refers more specifically to a definite kind of book. It is also due to system shifting that we have no difficulty in determining that All men are born equal does not exclude women from equal privileges.

One striking feature of lexical systems is that they are often 'ad hoc'. For example, people tend to speak in terms of cardinal colors. When an orange colored jacket is referred to as a red

jacket (Do you see the man in a red jacket?), the meaning of the signal is that it is not white, not black, not grey, not blue, not maize, in a word not the color one would usually think a jacket may be, except what is referred to as red. The hearer would match all the jackets in sight and decide that the orange one fits best. So he would understand the speaker as referring to the orange jacket. Here we are said to be using red in a rough sense.

2.3 The Interpretation of Lexical Signs

From the brief description of lexical systems above, it is clear that when we use our intelligence to interpret a lexical sign we are trying to determine the opposition it forms, the specificity level at which it is used, and/or the ad hoc meaning it acquires in the context. That is to say, we go along much the same tracks as when we interpret grammatical signs.

3.0 The Role of Inference in Sign Interpretation

In the above we have tried to show that the interpretation of both grammatical and lexical signs can, in the final analysis, be described as the determining of the system of oppositions that is contextually activated. Now we go on to show that logical inference underlies this process of determination whenever ambiguity results from homonymy or lack of clarity in general.

3.1 Logical Inference at all levels of Language Use

It has been mentioned in 1.1 that the Gricean pattern of the working out of conversational implicatures is at work at the various levels of language use. Here we quote Grice's own formulation: "He has said that p; there is no reason to suppose that he is not observing the maxims, or at least the CP; he could not be doing this unless he thought that q; he knows (and knows that I know that he knows) that I can see that the supposition that he thinks that q is required; he has done nothing to stop me thinking that q; he intends me to think, or is at least willing to allow me to think that q; and so he implicated that q." (Grice 1967)

It remains for us to illustrate the process

at the various levels of phonology, lexicon, syntax and discourse.

3.1.1 Inference at the Phonological Level

Like all other linguistic systems, the phonological system is not free from homonymy. The neutralization of the voiced and voiceless consonants word-finally in such languages as Russian and German is a point at issue. Do we have archiphonemes here, or a different phonological system in __# position, or a different phonological system wherever there is a change in the system? From the view that linguistic systems undergo changes in language use, the loss of voicing in word-final position results simply in a variant of the phonological form of the word to be interpreted, through inference, as **linguistically** the same as the form with the corresponding voiced consonant. The inferential process briefly is like this: he has said [sat], but his utterance is meaningless unless he means sad (garden), it is usual for the Russians to pronounce the voiced consonants as their voiceless counterparts, there is nothing to prevent us from taking [sat] as sad, therefore what he means is sad.

There are two remarks to make here:

(1) The inferential process is, needless to say, unconscious, more so at the phonological level than elsewhere. Hearing [rot], a native speaker of Russian would assign it either to the morpheme /rod/ "species" together with other forms such as [roda] "species-GEN", [rodu] "species-DAT", etc., or to the morpheme /rot/ "mouth" together with other forms such as [rta] "mouth-GEN", [rtu] "mouth-DAT", etc. He does this as if instinctively, but in the final analysis the assignment can only be the result of a judgment based on the fitness of either paradigm to the semantic structure of the sentence.

(2) The conditions of neutralization (word-final position and others) reflect the regularities of the pronunciation of native speakers, but they are not essential for understanding. If only the minimal data (grammatical, lexical and discoursal) are there for inferences to go on, hearers can manage to arrive at the message signalled without knowing the conditions for neutralization.

In many Chinese dialects, n and l do not contrast, although they do in Mandarin.

Therefore, it is not uncommon for speakers of those dialects to say:

(10) qing chi ni, zhe ni hen hao chi
please eat ni, this ni very good eat

which means, for Mandarin speakers, "Please eat the mud, this mud is very delicious." Here, the Gricean inferential process would be triggered: "He has said ni 'mud', he could not be doing this unless, because of the non-differentiation of ni and li in his dialect, what he meant was li 'pear', he has done nothing to stop me thinking that he meant 'pear' instead of 'mud', so he must have meant 'Please eat the pear, this pear is very delicious'."

Inferences may also be triggered by intonation. For example, in the question-answer pair:

(11) A: Where's the spaghetti sauce?
B: On the shelf (rising).

the rising intonation after "On the shelf" primarily signals the speaker's uncertainty. However, when uncertainty is excluded (e.g. if B is a housewife and has just been using the sauce), then the usual process entails: since B cannot be uncertain about the whereabouts of the spaghetti sauce, the rising intonation can only mean an avoidance of the possible implication of self-assertion or rudeness of the falling intonation. Hence women's preference for it.

3.1.2 Inference at the Lexical Level

In the phrases in a bank and on the bank, the word bank is not homonymous from a systematic view. But the sentence:

(12) His aim was to consolidate the bank.

is ambiguous. What we do in order to disambiguate it is to make an inference on the basis of contextual knowledge, e.g. if, for example, the general topic is to make preparations before the rainy season, the sentence is not meaningful unless it means the strenghthening of the river bank. Again, because this inferential process is so familiar, it is usually thought that just by pointing to the context the word bank would be disambiguated. Actually, the jump in conclusion

from preparations against flooding to the consolidation of river banks can be made only because the inferential process lies behind it. This can be shown by the fact that if it should so happen that in the context the prevention of the collapse of a financial institution is essential to making preparations against the flood, the sentence may still mean the strengthening of the financial institution.

It is well-known that in irony or other instances of language use where strong emotion is involved words are often used to mean their opposites: poor devil, a fine little beggar, etc. This explains why, when the speaker apparently has no reason to like the person he refers to, the inferred message of a sentence like you are a nice guy is just the opposite of what it means.

Inference is indispensable in interpreting idioms and set phrases. One does not actually have to, and an advanced learner often does not, consult a dictionary to learn a phrase like have something on one's conscience, although it may be useful for dictionaries to contain it for confirmation. What a learner usually does is to infer: since conscience is not a substantial thing, it cannot have anything on it unless in a figurative sense and since conscience means a person's natural goodness, to have something burdening it can only mean, figuratively, "to feel guilty for something".

The sentence He offered her his hand has to be disambiguated, and, theoretically at least, only when both the sense of offering her a hand to be shaken and the interpretation of offering her help have been excluded, can the idiomatic meaning of a proposal of marriage be decided on.

The meaning of some idioms cannot be inferred, but a learner has to go through the process of excluding the literal interpretation anyway. Thus, only after making sure that the literal meaning of kicking a bucket makes no sense in the context, can a learner turn to a dictionary or to someone else for the meaning of kick the bucket. In the case of It's raining cats and dogs, no interpretation can be worked out to be excluded, but one has at least to go through the process of reasoning that "literally the sentence doesn't make sense, so it must have some idiomatic meaning".

In this way it is not surprising that a cyclist should, as reported in Bolinger (1981),

think of saying, with a twist of his wrist:

(13) I find that the easiest way to shift gears is just to kick the trigger.

A hearer would interpret his kick as containing all the semantic features of kick with the exception of [+foot], and consequently substitute [+wrist] for it. This would be the result of a reasoning process: "No one could conveniently shift gears with his foot, therefore he could not have said kick unless he meant a movement of his hand, he indicated this with a twist of his wrist, therefore what he meant was 'to make a movement with one's hand that is like a kick'."

3.1.3 Inference at the Grammatical Level

Inference disambiguates homonymous grammatical structures and interprets grammatical irregularities, just as it does lexical items. Disambiguation through inference begins with the identification of the inflectional endings. After all, how do we know that in the Russian sentence:

(14) Ljublju otsa djevushki.
love-1sg father-ACC girl-GEN

or its Latin equivalent:

(15) Puellae patrem amo.
girl-GEN father-ACC love-1sg

djevushki and puellae, which according to their form may either be genitive singular or nominative plural, are in the genitive case, except by reasoning: since they could not be in the nominative plural, they must be in the genitive singular (these two being the only possible choices)? Likewise, whether the Russian sentence:

(16) Otsa djevushki ljubjat.
a. father-ACC girls-NOM love-3pl
b. father-ACC girls-GEN [people] love-3pl

or the equivalent Latin sentence:

(17) Patrem puellae amant.
a. father-ACC girls-NOM love-3pl
b. father-ACC girls-GEN [people] love-3pl

means "the girls love (their) father" or "(People) love the girl's father" can only be worked out, on contextual data, by applying the formula: either p or q, since not p, so q. When the choice is to be made from more than two possible terms, then: since not p, nor q, nor r ..., so s.

Inference, or rather inference based on linguistic knowledge and contextual data, can also deal successfully with the interpretation of deviant forms of grammar. For example, in the following two dialogues:

(18) Victoria: All the servants have given notice now.
Frederick: They haven't!
--W. Somerset Maugham

(19) Sally: I've got a job.
Olive: You haven't!...What's the job?
--John van Druten

haven't is ambiguous between a negation of the have in the previous sentence and an emotional response to this have by way of meaning the opposite of the negative form (e.g. They haven't means They have! cf. nice guy -- bad guy in 3.1.2). Contextual data--in Maugham's dialogue, Frederick has just come back, while Victoria has been home all the time; in van Druten's Olive goes on to ask "What's the job?"--remove the possibility of a literal interpretation of haven't as the negation of have, therefore both They haven't and You haven't in these two examples carry the message of great surprise: "They have!" and "You have!"

This is not intuitive interpretation, because not only is the inference conducted in accordance with the Gricean formula, but it is based on the linguistically viable commutation of the semantic opposites.

3.1.4 Inference at the Lexico-Grammatical Level

In contemporary linguistic literature, there has been a long tradition of regarding grammar as the sole embodiment of the systematic nature of language, leaving the lexicon a passive role of nonsystematic, linguistically uninteresting carriers of grammatical relations. Hence the discrepancy between the learned view of the study of language as mainly a grammatical discipline and

the popular idea of language as words and their use.

It will be remembered that Saussure in his Course in General Linguistics illustrates the nature of the linguistic sign and linguistic value mainly with examples from the lexicon--words. Why this practice was not followed in linguistic tradition is not clear, but it may be a result of the attempt to have as little to do with meaning as possible and the abhorrence for concepts. However, if we take a look at Chinese grammar without preconceptions about autonomous syntax, we will see that the argument for an active role of the lexicon is quite strong. In this section we shall see how lexical meaning may, through speakers' capacity for inference, determine the message of an utterance in default or even in spite of the grammatical structure.

As is well-known, there are many sentences in Chinese which are either subjectless or objectless, or both, and there are sentences which are normally either active or passive. Such sentences are usually said to be interpreted pragmatically. However, pragmatics as an outlet for difficulties in formal linguistics is growing unmanageable. One would like to see its scope narrowed, and this can be done to a considerable degree if it can be shown that signals to the exercise of intelligence and understanding may come from the lexicon, as well as from the grammar.

Take, for example, a sentence like:

(20) haizi bao qu le.
child embrace go PERF

The grammar of Chinese produces an ambiguity of interpretation: either "The child has been carried away", or "The child has carried (sb./sth.) away". It has to be disambiguated according to whether it is said in answer, for example, to "Where is the child?", or "Where is the cat?" If the whereabouts of the child is in question, then the inference presumably goes like this: "Since a question has been asked about the child, haizi refers to this child rather than any other child; and since there is nothing in the context saying that the child has carried away something or someone else, the message must be: the child itself has been carried away." In case the whereabouts of the cat is the point of interest, then haizi bao qu le is not

meaningful unless the action is performed by the child toward the cat and not the other way around. The verb bao (carry by embracing) also plays its role, since it is typical of the way a child is carried away or a child carries a cat. Therefore, the inferences are triggered by lexical items.

Such structures are regular, rather than exceptional, in Chinese. Here are some further examples:

(21) ji chi diao le.
chicken eat away PRT
(The chicken has been eaten up, or:
The chicken has eaten up something)

(22) mama jiao guo le.
mummy call EXPER PRT
(Mum has called, or: Mum has been called.)

(23) ni qu yiyuan kan guo le ma?
you go hospital look EXPER PRT Q-PRT
(Have you been to the hospital to have a look, or: Have you been to the hospital to be looked at (to see the doctor)?)

When one of the interpretations is pragmatically not permissible--usually the active one--then the sentence is unambiguous with its **wrong** grammatical form and no context is required for the passive interpretation:

(24) xin yijin shoudao.
letter already receive
"The letter has been received."

(25) hua jiao guo le.
flower sprinkle EXPER PRT
"The flowers have been sprinkled."

(26) cheng gong po le.
city attack broken PRT
"The city has been broken open under attack."

In examples (24-26) we have strong evidence that sometimes lexical meaning may have precedence over grammatical structure in determining sentence meaning. These sentences not only have a passive interpretation, but the passive particles bei, gei, etc. are normally not used in them, except when the occasion is thought to be in some sense out of the ordinary. Thus (26), being an out-

standing event itself, can readily be turned into:

(26a) cheng bei gong po le.
city PASSIVE attack break PRT
"The city has been broken open under attack."

(25) can have the passive particle only when some additional meaning has been put in to make the occasion noteworthy, for example:

(25a) hua gei yong kaishui jiao guo le
flower PASS use boiling water sprinkle EXP PRT
"The flowers have been sprinkled with hot water."

As for (24), it is difficult even to imagine an occasion when the passive particle would be used.

One may of course provide pragmatic explanations for both the ambiguous and unambiguous sentences above. But, for one thing, it is advisable to avoid throwing everything into pragmatics. More importantly, a lexico-grammatical, rather than pragmatic, interpretation helps to resolve two difficult problems about Chinese grammar: 1. the extremely frequent occurrence of topicalization, for which there is often no particular motivation, and 2. the existence of what may be considered the reverse of topicalization: subject in object position. For example,

(27) tai shang zuo zhe zhuxituan.
platform on sit STAT presidium
"The presidium is sitting on the platform."

(28) lu pang ting zhe yi liang che.
road side stop STAT one CL vehicle
"A car is parked at the roadside."

The difficulty that sentences like (27) and (28) create for Chinese grammarians lies in the fact that there seems to be absolutely nothing to say about these subjects (zhuxituan and che) sitting in object position in order to save a word order-based grammar from going to shambles, except to call tai shang (on the platform) and lu pang (at the roadside) **subjects**, which some grammarians actually do.

With the active role of lexical meaning and the inferences it triggers taken into account, however, Chinese grammar seems to be saying, in a

reasonable way: since Lao Li da Lao Wang and Lao Wang da Lao Li ("John beat Jim" and "Jim beat John") are both possible events in this world and one has therefore to differentiate the one from the other, of course word order is important here; but letters are always received by someone and never receive anyone; flowers are sprinkled on and never sprinkle; men sit and not are sat on; cars can only be made to stop, so why bother about word order? Regardless of word order, simplicity is achieved in (24-26), and a special form for descriptive statements, with the subject sitting after the verb, is made possible, as in (27) and (28).

Another argument for an active lexical role can be found in sentences like (29), where there is a typical collocation between noun and verb:

(29) laoying diao qu le.
hawk hold in mouth go PRT.
"The hawk has snatched (it) away."

Although (29) is structurally ambiguous like (20), actually it can only mean an active relationship between laoying and diao because diao typically collocates only with laoying and huangshulang (weasel). So much so that in answer to a question like "Where is the chicken?", some Chinese would use (30), which, grammatically speaking, is the passive form of (29), to convey the same message as (29).

(30) laoying gei diao qu le.
hawk PASS hold in mouth go PRT
Literally: "The hawk has been snatched away";
actually: "The hawk has snatched (it) away".

Here the typical active voice collocation between laoying and diao, together with the inference that this must be a statement about the whereabouts of the chicken and not of the hawk, succeeds in neutralizing the passivization function of gei and assigning it a new meaning of emphasis.

The potential collocation of a verb can also influence the interpretation of a sentence where there is no subject. Therefore,

(31) xia le (or) zai xia le
down (verb) PRT PROG down PRT

has the unmarked meaning of "Rain is falling",

because xia typically collocates with yu (rain). It also collocates with xue (snow) or people coming down from a mountain or some other high places. But these are marked cases where either the subject should be present, or a context is required. In a cooking situation, xia is often transitive with an implied object (food to be boiled in water, especially noodles). Therefore (31) in the mouth of a waiter would mean: "The noodles are being put into the water to be boiled."

If we look at these transitivity relationships in Chinese as eventually determined by inference based on lexical information, then we find uniformity between transitivity and such other major categories as number and tense. As is well-known, the category of number is absent in Chinese nouns. Whenever necessary, number is expressed lexically, either directly with numerals ("three table", "two person"), or indirectly with adverbials, deictics, etc. ("table all destroyed","these book", "a half guest already arrived" (half of the guests have arrived) and so on). There is available a plural particle men, but its use, except in pronouns, is limited to nouns meaning humans--and even then not obligatory except in a few functions, such as in an address where numerals or deictics are absent. Likewise, the category of tense is absent in Chinese ("He dies at 1789 year"). There are a number of particles to be used if necessary: guo (verb perfect particle), le (verb or sentence perfect particle), etc.

The influence of lexical items on sentence interpretation is not non-existent in English, though much rarer than in Chinese and therefore neglected. The following set of sentences, for example, is given in Fillmore (1972):

(32)
A. Harvey viciously took advantage of Melissa.
B. Melissa was viciously taken advantage of by H.
C. Harvey willingly took advantage of Melissa.
D. Melissa was willingly taken advantage of by H.

The adverb viciously in both A and B relates to Harvey's participation in the act, while willingly in C and D relates to the participation in the act of the individual in the surface subject NP. Fillmore (1972) explains as follows:

> certain adverbs may be introduced into a sentence as ways of qualifying one participant's role in the activity... Thus Manner adverbs of the type viciously may appear only in sentences having underlying Agents, the scope of the adverb being unaffected by the ultimate choice of surface subject.

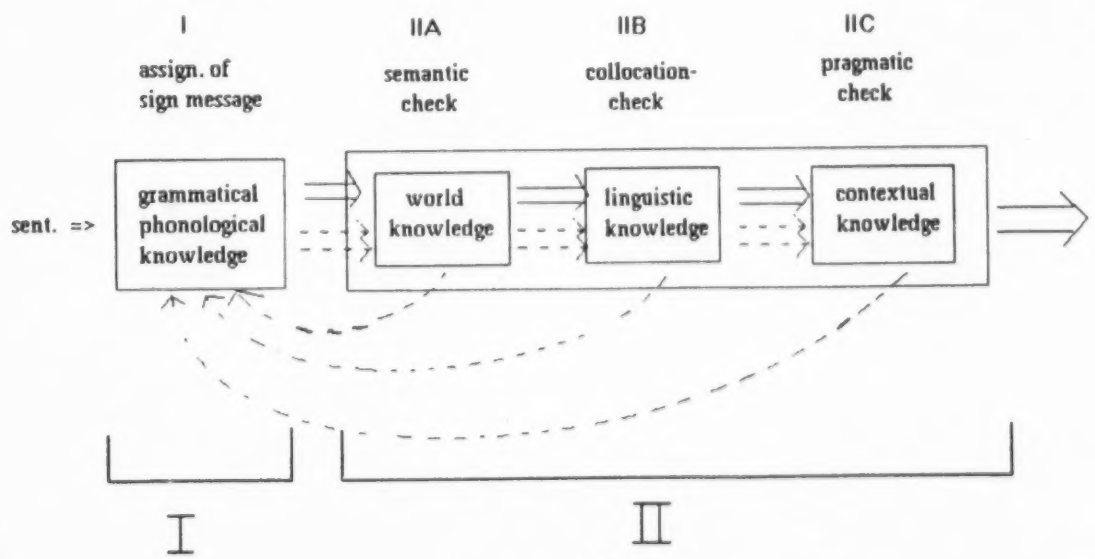
This is to say that manner adverbs of the type viciously always qualify the underlying Agent's activity. We are still not enlightened as to why this is so, and what type viciously represents.

From the viewpoint of the influence of lexical items on the interpretation of grammatical structures, A, C, and D have interpretations, as predicted by the grammatical structure. The predicted interpretation for B, however, is blocked by the incompatibility in meaning of the adverb viciously with the patient of the act of taking advantage. The only alternative is to relate viciously with the agent of the act. The resulting interpretation works. So, it is nothing but a process of: since not p, then q.

3.2 A Model for Inference in Sign and Sentence Interpretation

In order to provide a unified model to explain what mechanism is behind the performance of the inferential processes at the various levels of language use discussed in 3.1, the following is suggested:

FIGURE 5



Here II, the working out of the sentence message, is seen as a check on the interpretation reached at I. The interpretation is checked semantically, collocationally, and pragmatically. If it fails to pass a check (when no coherent message is obtained), it is sent back through the dotted curved line to I to be processed again. When a check is successfully passed, the output, just as the output of the sign assignment process at I, can only be either an unambiguous or an ambiguous interpretation. The former is represented by ⟹ and the latter by ⟹ (which indicates not only 2-way, but 3-way or multiple ambiguity). The arrows ⟹ and ⟹ are therefore mutually exclusive. Inferences take place at the various checks on the basis of the output of the previous analysis or check with the help of the knowledge typical of the current check: world knowledge at the semantic check, linguistic knowlege at the collocational check and contextual knowledge at the pragmatic check. It is normal for the output of the semantic or the collocational check to be either ambiguous or unambiguous no mattter whether the input is ambiguous or unambiguous. The output of the pragmatic check is expected to be unambiguous because we have reached the end of the procedure of interpretation. If an ambiguous interpretation nevertheless results, either a larger context is needed for its interpretation, or the sentence may be judged as incoherent.

A non-ambiguous sentence used in its literal meaning, such as (1) (Shakespeare was a great playwright), goes through all the checks without any changes. If however the sentence is used to imply that Shakespeare was no great philosopher, then the hearer will have to go through a Gricean process of inference at the pragmatic check (IIC), triggered by the sentence's lack of relevance to the topic in its surface meaning. He will infer the implicated message on the basis of his contextual knowledge that Shakespeare's greatness as a philosopher is the topic of the conversation.

The structural analysis of the Russian sentence [eto sat] will give at I, in consequence of the phonological rules concerned, either eto sat or eto sad. The first variant is rejected by the semantic check (IIA) as meaningless, therefore we have eto sad 'This is a garden'.

The dialectal Chinese sentence ging chi ni gives two variant interpretations both at I and IIA, because 'Please eat the mud' and 'Please eat

the pear' are both grammatically and semantically normal, but the collocational check (IIB) will bias the hearer strongly against the former. Therefore IIB sends to IIC a still ambiguous but biased (towards the 'pear' interpretation), which IIC eventually disambiguates in favour of 'pear' if there is no contextual evidence against it, but possibly also in favour of 'mud' when context forces this interpretation.

(11B), On the shelf (rising), will produce two interpretations at I: (a) "On the shelf?" (normal interpretation for rising tone), (b) "On the shelf + non-assertive tone (a sociolinguistic connotation of rising tone)". Both will go through IIA and IIB, until contextual knowledge excludes one of the variants through inference, e.g. if the speaker is a housewife in her own home, besides she has just used the spaghetti sauce, then the message cannot be (a), it must be (b).

Sentence (12) (His aim was to consolidate the bank), as already mentioned in 3.1.2 , has to be disambiguated at IIC.

He has something on his conscience gives two interpretations, one literal and one idiomatic, at both I and IIA. The collocational check IIB decides on the idiomatic explanation--the collocation of to have something on one's conscience is only used in its idiomatic sense. He offered his hand, on the other hand, can only get some bias at IIB and has to be disambiguated at IIC through inference with consideration of actual contextual circumstances.

They haven't! in (18) is unambiguous at I, and remains so through IIA and IIB, until this unambiguous interpretation of a negation of the previous statement is rejected by IIC because Frederick is just back home, and therefore he couldn't know better about the servants than Victoria, who has been with them all the time. It is sent back to I, where the lexical knowledge of the commutation of antonyms in an emotional state provides the interpretation "They have!", which sucessfully passes all the checks as the implicated message of the sentence.

Xin yijin shoudao (24) is an instance of how the two-way ambiguous interpretation at I is disambiguated at IIA with the help of world knowledge: since a letter never receives anyone or anything, it must have been received.

4.0 Conclusion

It is certainly very important to study the linguistic systems, because without a clear conception of these systems, it would be impossible to really handle the mess that is language use. However, linguistic systems alone are not enough to explain the verbal activities of human beings. Humans use their intelligence in communication, hence the importance of sign interpretation and logical inference in language use. The fact that the same kind of logical inference is at work at all levels of language use may be seen as a key to the problem that has been puzzling linguists for so long: why language is at the same time so difficult for experts to formalize, yet so easy for children to learn.

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References

Allan, K. (1986). Linguistic Meaning, Vol. 1 and 2, London: Routledge and Kegan Paul.

Austin, J.L. (1962). How To Do Things With Words. Oxford: Clarendon Press.

Bolinger, D. (1981). Aspects of Language, 3rd edition, New York: Harcourt Brace Jovanovich.

Fillmore, C.J. (1972). "Subject, Speakers, and Roles", in Davidson and Harman (eds.), Semantics of Natural Language, Dordrecht: D. Reidel Publishing Company.

Grice, H.P. (1967). "Logic and Conversation", in P. Cole and J.L. Morgan (eds.). Syntax and Semantics, Vol.12. New York: Academic Press.

Jakobson, R. (1949). On the Identification of Phonemic Entities. Selected Works I, 418-25. The Hague: Mouton.

Saussure, F. de (1916). Course in General Linguistics, translated by Wade Baskin. London: Peter Owen, 1960.

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